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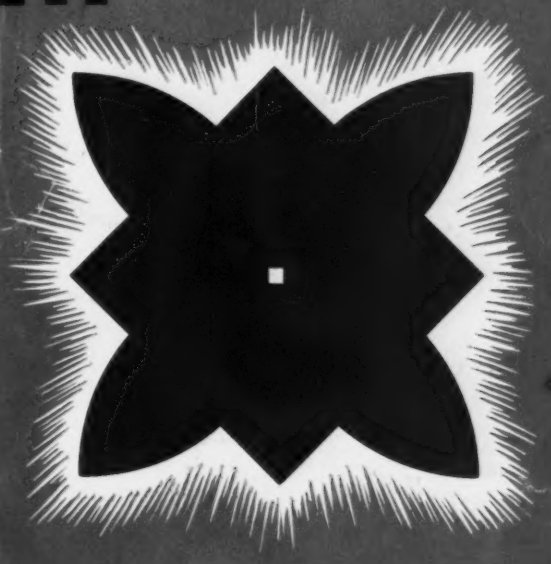
Paper TRADE JOURNAL

REG. U. S. PAT. OFF.

VOLUME 126, No. 14 APRIL 1, 194

## CIRCLE PUZZLE

The design at right can be divided with two cuts into four parts, all equal in size and shape, which, when properly fitted together without overlapping, form a perfect circle. Better trace this shape on another piece of paper before you try.



*If this puzzle solution*
*Is troubling you*
*See our adv. next month.*

*And if dryer felt problems*
*Are bothering you*
*See Asten-Hill at once.*

## LAST MONTH'S PUZZLE SOLUTION

**WEIGHT PUZZLE**—Take six of the nine coins, place three on each side of the scale and, if the scales balance, the lighter coin will be in the remaining three. Of these, place one on each side of the scale and, if they balance, the lighter coin is the one that remains. If, however, the coin should be among the first six weighed, eliminate the heavier three and then of the remaining three, place one on each scale as above, etc.

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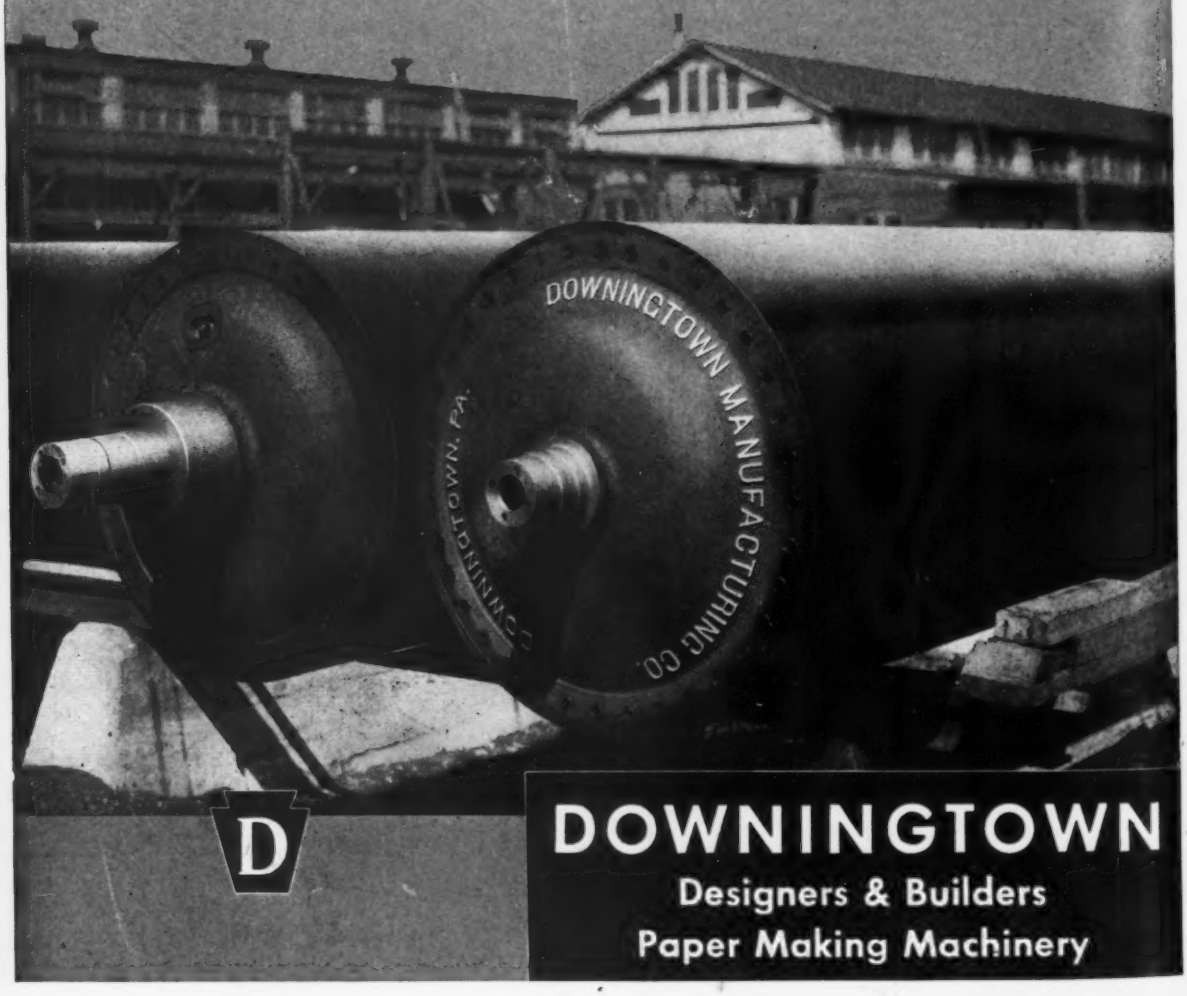


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DOWNINGTOWN
Designers & Builders
Paper Making Machinery

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**Volume 126** — **Number 14**

# Paper TRADE JOURNAL

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## CALENDAR OF COMING EVENTS

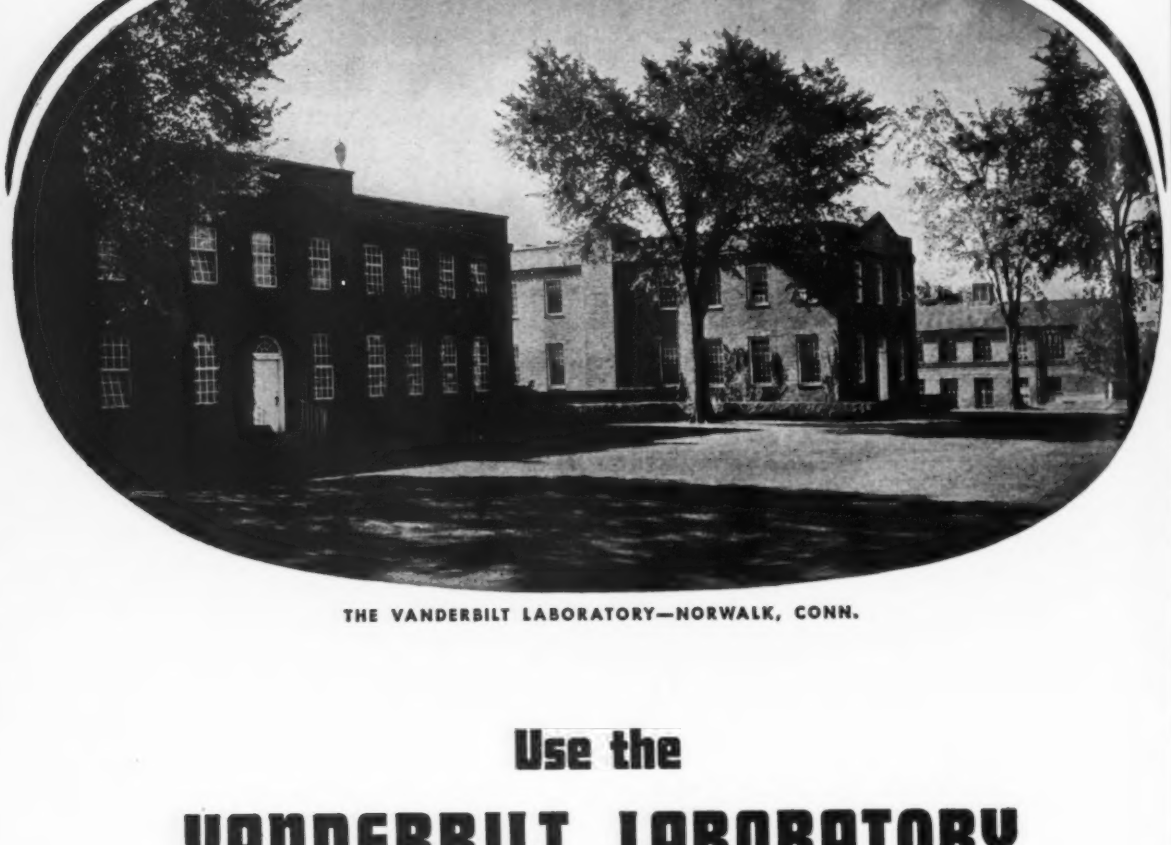
April 5-7—National Paper Trade Association, Annual Convention, The Waldorf-Astoria, New York City.

April 28-29—National Paperboard Association Spring Meeting, Seaview Country Club, Absecon, N. J.

May 9-12—National Paper Box Manufacturers Association, Annual Convention, Cincinnati, O.

May 19, 20, 21, 1948—American Pulp and Paper Mill Superintendents Association, Annual Meeting, Roosevelt Hotel, New Orleans, La.

June 11-12, 1948—Paper & Twine Association, Annual Convention, French Lick Springs, Indiana.



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Paper TRADE JOURNAL

VOLUME 126, NO. 14 REG. U.S. PAT. OFF. APRIL 1, 1948

## Waste Dealers Elects Danziger President

BOSTON — Sidney Danziger of H. Kramer & Company, New York, was elected president of the National Association of Waste Material Dealers held Wednesday afternoon at the Hotel Statler, for the ensuing year, succeeding Joseph H. Tyroler. Other officers elected included the following:

Charles M. Haskins, after thirty-five years as secretary and treasurer, was honored on his retirement, and at the annual dinner was presented with a Cadillac by Carlton B. Overton who acted on behalf of Mr. Haskins' wide circles of admirers. Clinton M. White, who has been executive assistant, was advanced to be secretary.

It was one of the largest meetings in the history of the Association. The meeting was presided over by the outgoing president, Mr. Tyroler. Prior to the business of the meeting, the members of the Association were addressed by Morris S. Rosenthal, president of Stein, Hall & Co., Inc., New York. Mr. Rosenthal spoke on the importance of the European Recovery Program not only to the 16 nations embraced by the Marshall Plan, but also to the United States.

A glowing tribute to Mr. Haskins for his unselfish devotion to the welfare of the industry was paid by Joseph Schapiro of S. Schapiro & Sons, Inc., of Baltimore, Md. He traced the trials and tribulations of the Association in its formative years and also the difficulties that the Association encountered during the years of the depression, and said that it was a tribute to Mr. Haskins, who acted as a lighthouse for the industry. He added that it was through his untiring efforts and singleness of purpose that various branches of the industry were welded into a strong national organization and that the position that the Association occupies today is largely the result of the faithful devotion, frequently at great personal sacrifice, by Mr. Haskins.

Mr. Danziger announced that the Fall meeting of the Association will be held in Mackinac Island, Mich., on September 17, 1948, and that the next annual convention of the Association will be held in Chicago at the Stevens Hotel on March 21, 22 and 23, 1949.

Approximately 150 members of the Cotton Rag Council, met at the Statler Tuesday, under the chairmanship of the Council president Julius Levine. A special Trade Practice Committee

*(Continued on page 16)*

# Swollen Flood Crest Closes Twenty Holyoke Paper Mills

HOLYOKE, Mass.—Twenty paper mills in Holyoke were closed this week. as rising waters of the Connecticut River—swollen by heavy rains and a sudden spring thaw—threatened this paper industrial area before a sudden cold snap ended the danger of a serious flood.

The muddy, ice-filled, swirling waters of the Connecticut climbed to a stage of 18.5 feet at nearby Springfield—a scant 9½ feet below the level of the 1936 flood which caused millions of dollars worth of property damage throughout this area.

The Connecticut's stage—brought about by heavy rains which overspread the Connecticut Valley and by a sudden thaw from the source of the Connecticut to its mouth—was the highest point it had reached since the 1936 flood.

As soon as flood level was reached here, it was a signal for the paper mills to take emergency steps, and the Valley Paper Co., was the first to act as orders were issued to shut down the papermaking machines. Others followed suit.

As Holyoke's new flood wall received its first real test, officials of various papermaking concerns voiced mixed feelings on the project. Vice-President Edward C. Reid of the American Writing Paper Corporation, and President Russell S. Madden, Sr., of the Valley Paper Company, were both confident relative to conditions in their respective mills. While both shut down production due to high water, which cut off power, the finishing rooms of these companies continued in operation and no steps were taken to remove valuable stock and machinery from the cellars.

In the south end of the city, where work is still underway on the floodwall, officials of the various plants were worried as the waters climbed.

At the Franklin Paper Company, evacuation of stock from the cellar was started as the waters swirled closer to the top of the dikes. At the Chemical Paper Manufacturing Company, and Newton Paper Company, work was suspended and plans were made to provide for stock removal, if necessary.

## Nichols Will Return To the West Coast

NEW YORK — Harold O. Nichols, eastern manager for the Crown Zellerbach Corporation, is to return to his native San Francisco about May 1 to assume new duties at the general offices of the company in that city. He is slated to be made sales manager of a newly constituted multi-wall bag operation which will be operated from a bag plant that is to be made ready at Port Townsend, Wash., where the company has made kraft pulp for the past twenty years or so.

In returning west, Mr. Nichols ends a "Temporary" assignment of some fourteen years ago when he came east to represent the company's interests in connection with the N.R.A. and remained as eastern manager for the company. He has been active in association affairs, and last month terminated a tour of duty as chairman of the Sulphite Paper manufacturers group.

A group of his associates and friends tendered him a farewell dinner at the Biltmore, on April 1, as this issue of PAPER TRADE JOURNAL is going into the mails.

H. O. NICHOLS
Heading home after fourteen years

## Commercial Chemical Group Elects F. A. Soderberg

NEW YORK—The Commercial Chemical Development Association has elected Frederic A. Soderberg as executive secretary. Membership in this organization is limited to those in responsible charge of the various aspects of chemical development. These phases include technical service, market research, market development, product development, application research and other activities contributing directly to the commercial development of chemicals. The association's objective is advancement of commercial chemical development in theory, practice and application while maintaining high professional and ethical standards.

Mr. Soderberg is Director of Paper Service and Development with the General Dyestuff Corporation, a member of TAPPI, American Institute of Chemical Engineers and Vice-Chairman of the American Chemical Society's Chemical Marketing Section.

© Fabian Bachrach

F. A. SODERBERG

## Marathon Names Lingelbach Head of Bakery Packaging

MENASHA, Wis.—Charles J. Lingelbach has been appointed as bakery industry packaging specialist of Marathon Corporation, it was announced last week by Frank L. Broeren, director of the company's product development department.

Lingelbach succeeds Melvin A. Dawson, recently assigned to the New London, Conn., bakery division sales territory with headquarters in Boston. Lingelbach will be primarily interested in automatic packaging and labeling development involving the use of Marathon super seal bread wrappers, paraply bakery packages, end labels and packaging problems peculiar to the baking industry.

A chemical engineering graduate of the Michigan College of Mines and Technology, Lingelbach was associated with the Pabst Brewing Company until his entry in active duty with the army air forces in June, 1941. He was released with the rank of lieutenant colonel in September, 1945, and has since been connected with the Institute of Paper Chemistry, Appleton, Wis.

## John Bellows Retires At Byron Weston

DALTON, Mass.—John H. Bellows, first vice-president and treasurer of the Byron Weston Company, will retire from active work on April 1, after 46 years of continuous service. He will, however, remain on the company's board of directors. He will be succeeded as treasurer by Alexander Euston, who began work with the company in 1940, when he joined the sales force in New York. He transferred to the Dalton office in 1942, and has been acting as assistant to Mr. Bellows and as personnel manager.

Other officers elected by the stockholders and directors are: Hale Holden, Jr., president; Robert Crane, vice-president and secretary, and Thomas J. Fahey, assistant treasurer.

Born in Kinderhook, N. Y., in 1877, Mr. Bellows came here with his family in 1886 and attended the Dalton public schools. He also attended the Kimball Academy, Meriden, N. H. He started his business career with the Dalton Shoe Co., and was employed there for four years.

## Ray Perrault Appointed Smith Personnel Head

LEE, Mass.—S. Ray Perrault has been named to succeed Elliot G. Pease as personnel manager of Smith Paper, Inc. Mr. Pease has terminated his contract with the company.

Mr. Perrault, who joined Smith Paper Jan. 1, 1947, following five years in the U. S. Navy, has held the post of assistant personnel manager since joining the company.

Mr. Pease joined Smith Paper, Inc., on Feb. 1, 1943, as personnel manager. Prior to this he did engineering surveys on land and water rights for the company.

## Bedell Heads Sirrine Company

GREENVILLE, S. C. — A. S. Bedell was elected chairman of the executive committee at the annual meeting of J. E. Sirrine Company, internationally known engineering firm. Henry L. Hagerman was named vice-chairman. Other members of the committee are George Wrigley, A. D. Asbury and R. R. Adams.

## Tall Oil Group Again Elects Leonard Doyle

NEW YORK—At the annual meeting of the Tall Oil Association held on March 17 at the Hotel Biltmore, Leonard J. Doyle of the Union Bag & Paper Corporation was re-elected President and Alert Scharwachter of the Arizona Chemical Company was re-elected Vice-President. The following members of the industry were elected to the Association's Board of Directors: J. A. Auchter, North Carolina Pulp Company, Camden, New Jersey; A. T. Cirino, West Virginia Pulp and Paper Co., 230 Park Avenue, N.Y.C.; W. J. Damtoft, Champion Paper & Fibre Co., Canton, N.C.; L. W. Gould, Gaylord Container Corp., 111 N. 4th St., St. Louis, Mo.; A. E. Griffin, Camp Manufacturing Co., 60 E. 42nd St., N.Y.C.; J. W. Sale, Hummel-Ross Division, Continental Can Co., Hopewell, Va.; R. J. Spitz, Newport Industries, Inc., 230 Park Ave., N.Y.C.; C. B. F. Young, National Southern Products Co., 630 Fifth Ave., N.Y.C.

Dernell Every will continue as Secretary-Treasurer, T. K. Heston, Assistant Secretary-Treasurer and I. B. Oseas, counsel. Dr. Arthur Pollak, formerly chief of the Chemical Development Division of West Virginia Pulp and Paper Company, is technical consultant to the Association.

The preparation of a series of descriptive pamphlets on the uses for and the handling of tall oil was reviewed and approved. These pamphlets will be distributed to an extensive list of potential consumers over the next year.

## Denton Completes Task At Smith Paper Inc.

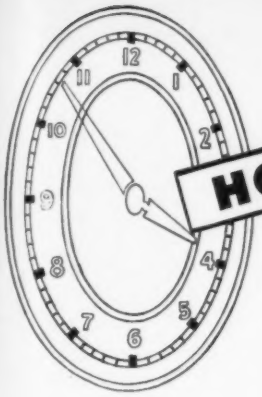
LEE, Mass.—Jess R. Denton, assistant production manager at Smith Paper, Inc., has completed his contract with the company and has terminated his duties. No successor has been named.

Mr. Denton, who joined Smith Paper in November, 1946, was formerly employed by the Ecusta Paper Corporation, in North Carolina. Prior to joining Smith Paper he worked in Brazil helping to rebuild a paper mill there.

While with the Lee firm he devoted most of his time to the Columbia Mill.

## Holyoke Machine Appoints Woosnam as Sales Head

HOLYOKE, Mass.—William Woosnam has been appointed sales manager of the Holyoke Machine Company, by Col. P. W. Bidwell, President of the company. Mr. Woosnam was until recently sales manager of B. F. Perkins & Son, and formerly was assistant superintendent of the old Pacific Mills Print Works at Lawrence.



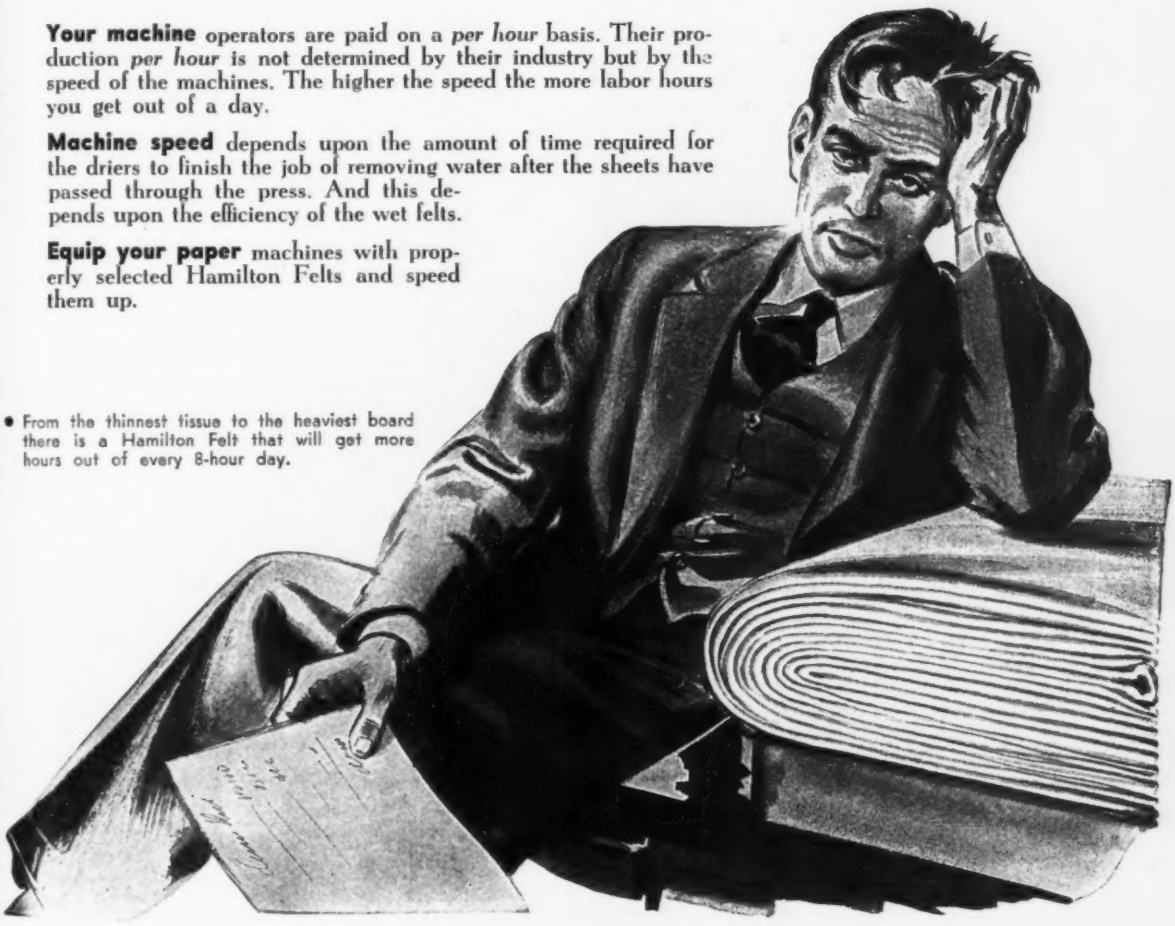
# HOW MANY HOURS IN AN 8-HOUR DAY?

**Your machine** operators are paid on a *per hour* basis. Their production *per hour* is not determined by their industry but by the speed of the machines. The higher the speed the more labor hours you get out of a day.

**Machine speed** depends upon the amount of time required for the driers to finish the job of removing water after the sheets have passed through the press. And this depends upon the efficiency of the wet felts.

**Equip your paper** machines with properly selected Hamilton Felts and speed them up.

• From the thinnest tissue to the heaviest board there is a Hamilton Felt that will get more hours out of every 8-hour day.



SHULER & BENNINGHOFEN, HAMILTON, OHIO

• Miami Woolen Mills •

Hamilton Felts

• Established 1858

## Northern Entertains Green Bay Firemen

GREEN BAY, Wis.—All members of the Green Bay fire department were guests Tuesday evening, March 23, at a turkey dinner given by the Northern Paper Mills, in appreciation of the firemen's work in putting out the $200,000 pulpwood fire in the mill's woodyard on February 29 and March 1. The company also presented a check for $1,000 for the firemen's pension fund.

The dinner was served simultaneously in all three firehouses. A. B. Hansen, president and general manager of Northern, was host at the No. 1 station; H. W. Gochnauer, chief engineer, at No. 2, and Edward Den Dooven, general superintendent, at No. 3. Other executives of the mill were present at the various gatherings. Also present were Mayor Olejniczak and Fire Chief Ralph H. Drum, each of the latter giving brief talks.

Mr. Hansen acted as master of ceremonies, carved the turkeys, presented the $1,000 check, played the violin to a piano at which Orville "Curly" Munson, driver of the No. 1 pump, presided, and was the principal speaker. Mr. Hansen said that Northern Paper Mills was glad to be host at the dinner, not in celebration of the fire but because of the successful fight against flames which might have been much more disastrous.

He thanked the other agencies cooperating and extended special thanks to the Hoberg Paper Mills for hose, water and manpower; to the North Western railroad for switching in a flat car for mounting a deluge set, within ten minutes of the time it was requested, and to Northern's own personnel.

The mill stayed in production throughout the fire, Mr. Hansen said, adding that every bit of equipment functioned properly. He said that the use of cranes as water towers proved so successful that permanent piping is to be run up the crane booms to simplify their use in another possible emergency.

The improvised canteen dispensed 121 gallons of coffee, 697 sandwiches and 329 hot meals during the fire, Mr. Hansen said.

### Carborundum Starts Work On Building No. 2

WHEATFIELD, N. Y.—On March 15 ground was broken for building number two at the plant of the Carborundum Company. Planned to be ready for occupancy in September, this building, 829 feet long and 230 feet wide, together with a new boiler house and the four buildings formerly occupied by the Bell Aircraft Corporation will be the new home of the Coated Products Division of The Carborundum Company.

Among other facilities the new building "Number 2" will house the "Making Machines," one of which will be about 57 feet wide and 400 feet long. When threaded, this machine will contain over 13 miles of paper or cloth used for backing in the manufacture of coated abrasives. One of the largest and most modern machines of its kind, it will be equipped with automatic controls for humidity, temperature and speed, and will turn out coated abrasive materials of precise qualities.

## Marathon Develops New Freeze Carton

WAUSAU, Wis.—A patent was issued about the middle of March to Marathon Corporation for the No. 5 frozen-food carton. Millions of the cartons are being manufactured here at present, the application for the patent having been filed September 9, 1944. The carton was developed at the carton division.

Since manufacturing began, a coast-to-coast demand has been created, for cold storage packs of peas, spinach, corn and other vegetables. It was ruled by the patent examiners at Washington that the collapsible carton is different in one respect from anything similar ever previously patented or known.

While other collapsible cartons have been offered on the market, it was said at the carton division here, the public has taken a particular liking for the locally-developed carton, which is made of light paper board and is a better constructed carton than others of the kind so far offered.

Cartons for packages weighing up to 2½ and 5 pounds are being produced, but the heavy demand is for the pound-size carton.

An over-wrap for the cartons is made at Marathon at Menasha. It provides a moisture-proof wrapper for the package as it goes into the freezer. A specially-made machine has been developed and is on the market for opening up the cartons, after which it also automatically fills and closes the carton, pursuant to which the carton goes into a standard wrapping machine.

Harold Riege and Edwin C. Siewert were among employes who helped develop the patent, and have assigned their interests to the corporation.

### New Haven Plant Damaged

NEW HAVEN, Conn.—Nearly $10,000 damage was caused by a fire at the New Haven Pulp & Board Company plant, 259 East Street, last week, company officials reported. The blaze, battled by five companies of firemen, put one of the firm's large paper-making machines out of commission.

The fire was confined to a section of the open rolling department building. The flames, apparently caused by a faulty rolling machine, spread rapidly, feeding on paper scraps, lint and interior woodwork.

## Worthy Paper Passes To New Ownership

SPRINGFIELD, Mass.—The Worthy Paper Company Association in North Agawam has been sold by the National Printing Company of Thompsonville, Conn., to John I. Robinson, attorney of this city, it has become known.

Douglas W. Ronaldson, general manager of the concern, confirmed the report of the sale, as did Mr. Robinson. It is known that Mr. Robinson is representing another party in the transaction, but would not reveal the identity of the party. He did, however, deny rumors that the purchaser is the Springfield Photo Mount Company.

"The National Printing Company, of Thompsonville, Conn., has sold its interest in the Worthy Paper Company Association to John I. Robinson," said Mr. Ronaldson. "The mill will be operated with the same personnel and will manufacture the same high-grade rag content papers as in the past."

Mr. Robinson said it is true that he had bought the property. He declined to give the name of the party for whom he is acting.

"I want to make clear," he said, "that it was not purchased by the Springfield Photo Mount Company, as has been reported."

It is understood that the report that the Springfield Poto Mount Co., had bought the concern arose from the fact that Mr. Robinson is counsel for the company and is one of the directors.

The Worthy Paper Company Association came into prominence in 1946 when Gorham Bliss, who then had the controlling interest, announced that he was going to sell it because a labor union had been chosen as the bargaining agent by the employes. The Thompsonville concern bought the property from Mr. Bliss in March, 1946.

The company employs about 75 workers, said Mr. Robinson.

### B. C. Industry Expands

VANCOUVER, B. C.—Phenomenal industrial growth of British Columbia is indicated in the latest report of the Workmen's Compensation Board. An increase of more than 100 percent of the number of "active" firms on the board rolls was reported in an 18-month period.

### Mead Deposits Employe Fund

ESCANABA, Mich. — The Escanaba Paper Company, a division of the Mead Corporation, has been advised that the corporation has deposited a check for $823,713.71 to the credit of the 2,513 participating employes under the corporation's retirement plan.

# isn't that the Mathieson Plant?

*"It's one of them, Mr. Jones—the Niagara Falls plant."*

Yes, Mr. Jones and there's another at Saltville, Va., to serve the southeast, and a third at Lake Charles, La., serving the southwest. With three plants, Mathieson offers triple flexibility in deliveries of caustic soda. Call it three sources of supply. That's why weather, breakdowns, railroad or labor conditions seldom keep Mathieson from making prompt deliveries.

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**Mathieson**
**CHEMICALS**

## Can and Tube Makers Prepare to Mobilize

NEW YORK—National Fibre Can and Tube Association directors last Thursday at the annual meeting of the organization in the Astor recommended that Paul S. Hanway, managing director, gather whatever data may be necessary for the various Government agencies to be prepared for mobilization. The action was made known in a talk by J. L. Coker, president of the Sonoco Products Company, Hartsville, S. C., who said:

"We are in a very serious situation as President Truman has committed this nation against Russian aggression and Congress must back him up. If we are going to prepare for war, we may not have it. But we must be prepared for industrial regimentation in peacetime. This means organization similar to the WPB of World War II and allocations in certain industries."

J. D. Malcolmson, technical director of Robert Gair Company, Inc., discussing the paperboard industry and its prospects, declared a large expansion of the industry is indicated as eleven new board mills were built in 1947 and seventeen additional ones are scheduled for this year. This represents a total expansion in output of 1,300,000 tons in two years alone. Paper board production last year of 10,000,000 tons was a new high, representing half of all production of paper.

Mr. Malcolmson said this expanded output of paperboard poses two major questions, both of which are being satisfactorily answered. One covers the necessary raw material and the other the sale of the production. Southern slash pine, he said, is used as the material, production of which is assured through conservation and growth measures treating it as a "crop."

Markets for expanded output are assured through a variety of new products, he said, including a new type of export shipping container, designated VUS, better and cheaper than the V box made for the Army during the war; packaging for perishables, principally fresh fruits and vegetables; meat, minus bones and fat to save freight costs; frozen foods, and packaging of "massive" commodities such as refrigerators, washing machines, etc.

George Ware, costing engineer and consultant, described methods for eliminating profit leaks through control of costs, knowledge of profit relationships of individual products, production control and greater efficiency through plant layout and equipment.

Mr. Hanway told the meeting that the country's economy would be better off with a real price correction. "If we do not get it reasonably soon," he said, "the correction will simply be so much worse and longer drawn out when it eventually arrives."

He expressed the belief that the price correction is delayed because of foreign relief and pointed out that the aid program, entailing expenditures of $20,000,000,000 over the next five years, will help retain high employment and purchasing power. He foresaw "prosperity for the essential industries and only fair business for the others."

G. W. Blunt White of the Sonoco Products Company, Mystic, Conn., was reelected president of the organization. He endorsed Mr. Coker's appraisal of the situation and called for complete cooperation of the members in finishing the required data. Other officers reelected were: vice-president, J. W. Barbey, Motor City Paper Tube Company, Detroit; treasurer, A. Niemand, Niemand Brothers, Long Island City; and Mr. Hanway, managing director and assistant treasurer.

### Laminated Foil Makers Form Trade Group

PROVIDENCE, R. I.—Eight manufacturers of laminated metal foil papers recently organized under the name of Laminated Foil Manufacturers' Association. At the organization meeting a set of by-laws was adopted and the following officers were elected for the fiscal year beginning February 1, 1948:

President, Don E. Campbell, Standard Rolling Mills, Inc.; Vice-President; Fred C. Kaiser, Keller-Dorian Corporation; Executive Committee, President, ex-officio, and and W. D. Peters, Reynolds Metals Company; Robert B. Hunt, National Foil Company. Arthur A. Thomas, who was appointed executive director under the articles of association, acts as the Secretary-Treasurer of the Association, with an office at 1002 Union Trust Building.

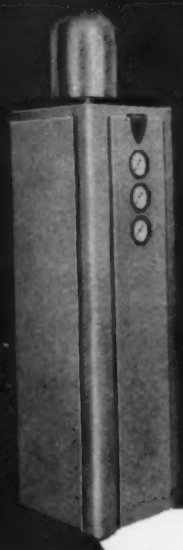
## Gummed Industries Launches Program

NEW YORK—Philip O. Deitsch, managing director of the Gummed Industries Association, this week explained the program of the Association to solve the vitally important problem of shipping damage. A nation-wide educational program on better sealing is designed to show shipping room personnel how to use and apply gummed sealing tape for maximum protection. The whole project is built around an educational sound slide film, designed for showing to shipping departments of industrial and commercial firms from coast to coast. This film will be made available to paper merchants all over the country, for showing to their customers' shipping room personnel. Mr. Deitsch states that this method of distribution will provide greatest coverage in the shortest possible time, and will, in addition, enable the paper merchant to render a valuable and much needed service to his shipper customers.

To get this program off to a fast start, the Gummed Industries Association has engaged two field men, Frank A. DeVore and J. Woods Sweeney, who are making a tour of the country, giving presentations to each of the Association's member manufacturers. Each manufacturer, in turn, will make presentations to each of his major paper merchants, who will then be in a position to show the slide film directly to thousands of shipping rooms all over the country. The Association's ultimate goal is to have this employee training program presented in every major shipping department in the United States. After presenting the program

*(Continued on page 30)*

Philip O. Deitsch (left), managing director of the Gummed Industries Association, gives last minute instructions to field men J. Woods Sweeney (center) and Frank A. DeVore (right) as they prepare for their cross-country tour to present the Association's new educational program to member manufacturers.



# THIS MACHINE MAKES PAPER...

## better... faster... cheaper...

The machine is a W&T Visible Vacuum Chlorinator for the controlled and dependable application of chlorine to stock, white water and fresh water supply to destroy slime and odor producing micro-organisms.

It makes paper BETTER because by eliminating bacterial spots and off-odors it improves quality—obviously essential in food papers.

It makes paper FASTER because it reduces down-time due to sheet breakage, prevents the formation of slime in felts and improves water removal.

And, finally, it makes paper CHEAPER because it reduces stock, chemical and heat losses, improves grade and saves labor.

*Write today to learn more about why leading paper and board mills everywhere have turned to W & T Chlorinators to solve bacteria-induced paper-making problems.*

**WALLACE & TIERNAN COMPANY, INC.**

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I-12

# FINANCE

## Minnesota Mining Reports Profit Up

WAUSAU, Wis.—Minnesota Mining and Manufacturing Company of St. Paul, Minn., which has a large roofing granule manufacturing plant here, last week reported a new high of $93,437,137 in sales volume last year, an increase of 24 percent over 1946, when sales totaled $75,169,623.

Net profits for 1947, including a special income credit of $930,000 and after preferred stock dividends, amounted to $11,598,376, equal to $5.94 a share on common stock, compared with $5.08 a share during the previous year. Dividends of $1.55 per share were paid on common in 1947.

W. L. McKnight, St. Paul, company president, called attention of stockholders to completion by the company during the year of the development and marketing of Scotch sound recording tape. He said the production "fits into our operations as we produce the pigments and resins used in its production and it is manufactured on machines similar to those used in the production of our other tape products."

His report also called attention to the profit-sharing and bonuses paid to workers in line with the company's belief that the company has been successful in large part through the incentives created by the profit-sharing and production bonus plans.

Additions to the property of the company include a new roofing granule plant at Little Rock, Ark., which went into operation in May, 1947, and a similar plant now under construction at Corona, Calif., as well as other plants.

There were 8,135 employes at the end of the year. The company manufactures Scotch cellulose tape, abrasives and a variety of industrial, commercial and consumer products. In addition to the operating base at St. Paul, factory operations are conducted in 15 cities, with sales and branch offices in 18 cities.

## Mando Earnings Reflect Increased Volume

MINNEAPOLIS—In the annual report of the Minnesota and Ontario Paper Company and subsidiaries released this week, Donald D. Davis, President, advised shareholders that the net income for 1947, after taxes and after appropriation of $400,000 to the reserve for contingencies, was $5,753,359.

The report discloses that net sales for the year 1947 were $48,996,712. Total current assets as of December 31, 1947 were $21,349,465 and total current liabilities were $9,686,813.

Mr. Davis further stated that increased earnings for the year reflect the benefits of continuous operations and increased volume, aided by moderate price increases.

## Hooker Earned $1,900,000 In First Quarter

NIAGARA FALLS, N. Y.—The Hooker Electrochemical Company reported estimated net income, before taxes, of $1,907,200 for the three months ended Feb. 29. After provision of $420,000 for federal income taxes and $53,125 for preferred dividends, the profit was equal to 77½ cents a common share.

## Gaylord Container Reports Record High

ST. LOUIS — Net sales of Gaylord Container Corporation rose to a record high of $57,713,000 during 1947, more than $13 million higher than in the previous year, according to the company's annual financial statements released here today. At the same time, gross production value for all sales of Gaylord products and services — including inter-company transfers — was up to $113,256,000, as compared with $76,500,000 in 1946.

The company's net earnings for 1947 were $9,529,000, or $4.06 per share of common stock. In 1946, per share earnings were $2.43. Dividend payments in 1947 totaled approximately $3,400,000. The balance of earnings was invested in plant facilities and working capital.

Principal products sold under the Gaylord trademark include corrugated and solid fibre boxes. The company also produces folding cartons, kraft grocery bags and sacks, wrapping paper, and a variety of other paper and paper board specialties. Gaylord operates large pulp and paper mills in Louisiana, 14 converting plants, and sales offices located in 37 cities throughout the nation.

At the end of 1947, Gaylord's working capital was $10,964,000, some $764,000 less than at the beginning of the year. This slight decrease resulted from the decision of the directors to redeem all outstanding debentures and other fixed obligations amounting to $4,500,000 and to make major plant and property improvements in excess to $3,700,000.

The company's capital structure, therefore, now includes a single issue of common stock consisting of 2,338,317 shares outstanding, owned by 4,444 individuals and institutions.

## FINANCIAL RECORD OF THE WEEK

### New York Stock Exchange

High, Low and Last for Week Ending March 27, 1948

STOCKS

| | High | Low | Last |
|---|---|---|---|
| A. P. W. | 5⅛ | 4⅜ | 5⅛ |
| Armstrong Cork. Co. | 50¾ | 49¼ | 49¼ |
| Armstrong Cork Co., 4 pf. 4 | 109⅝ | 108½ | 109⅝ |
| Armstrong Cork Co., pf. 3¾ | 93¾ | 93½ | 93¾ |
| Celotex Corp. | 25¾ | 25¼ | 25½ |
| Celotex Corp., pf. | 19⅞ | 19⅞ | 19⅞ |
| Certain-Teed Products Corp. | 15⅝ | 15⅛ | 15¼ |
| Certain-Teed Products Corp., pf. | .... | .... | .... |
| Champion Paper & Fibre Co. | 20½ | 18½ | 19 |
| Champion Paper & Fibre Co., pf. | 94 | 93 | 93 |
| Congoleum Nairn Co. | 32¾ | 31⅞ | 32¼ |
| Container Corp. of America | 39¾ | 38 | 39⅜ |
| Container Corp. of America, pf. | .... | .... | .... |
| Crown Zellerbach Co. | 29½ | 28⅜ | 29 |
| Crown Zellerbach Co., pf. 4.20 | 97 | 96¼ | 97 |
| Crown Zellerbach Co., 4 pf. 4 | 109⅜ | 107 | 109⅜ |
| Dixie Cup Co. | 35¼ | 33¾ | 35 |
| Dixie Cup Co., A | 50½ | 50 | 50½ |
| Flintkote Co. | 36⅛ | 35 | 35½ |
| Flintkote Co., pf. | 99½ | 99 | 99¼ |
| Robert Gair | 8½ | 8⅛ | 8¼ |
| Robert Gair, pf. | 18⅞ | 18¼ | 18⅞ |
| International Paper Co. | 49⅛ | 47⅛ | 49⅛ |
| International Paper Co., pf. | .... | .... | .... |
| Johns-Manville Corp. | 39⅛ | 36⅝ | 38⅞ |
| Johns-Manville Corp., pf. | 108¾ | 108¾ | 108¾ |
| Kimberly-Clark Corp., | 20¾ | 20¼ | 20¾ |
| Kimberly-Clark Corp., pf. | 97 | 94½ | 94½ |
| Mac Andrews & Forbes | 36⅞ | 36⅞ | 36⅞ |
| Mac Andrews & Forbes, pf. | .... | .... | .... |
| Marathon Corp. | 21 | 20½ | 21 |
| Mead Corp. | 18½ | 18 | 18 |
| Mead Corp., pf. 4¼ | 81 | 80¼ | 81 |
| Mead Corp., pf., 2 | 40½ | 40 | 40½ |
| National Container Corp. | 13⅛ | 12⅝ | 12¾ |
| Paraffine Companies, Inc. | 23½ | 23 | 23¼ |
| Paraffine Companies, Inc., pf. | 102¼ | 102 | 102 |
| Rayonier, Inc. | 26¾ | 26 | 26¼ |
| Rayonier, Inc., pf. | 33 | 32 | 33 |
| Ruberoid Co. | 59¼ | 57½ | 59¼ |
| St. Regis Paper Co. | 10 | 9½ | 9⅝ |
| St. Regis Paper Co., pf. | 83½ | 82½ | 83½ |
| Scott Paper Co. | 41½ | 41 | 41½ |
| Scott Paper Co., pf. | 91 | 91 | 91 |
| Sutherland Paper Co. | 38⅜ | 38 | 38 |
| Union Bag & Paper Corp. | 31 | 30 | 30⅝ |
| United Board & Carton | 13½ | 13½ | 13½ |
| U. S. Gypsum Co. | 101 | 98¼ | 98½ |
| U. S. Gypsum Co., pf. | 175 | 173½ | 175 |
| United Wallpaper | 4½ | 4⅛ | 4⅛ |
| United Wallpaper, pf. | .... | .... | .... |
| West Virginia Pulp & Paper Co. | 41½ | 40 | 40⅞ |
| West Virginia Pulp & Paper Co., pf. | 104½ | 102½ | 103¼ |

BONDS

| | | | |
|---|---|---|---|
| Celotex Corp., 3½s '60 | 99¼ | 99¼ | 99¼ |
| Certain-Teed Products Corp., 5½s '53 | .... | .... | .... |
| Champion Paper & Fibre Co., 3s '65 | .... | .... | .... |
| Mead Corp., 3s '68 | .... | .... | .... |

### New York Curb Exchange

High, Low and Last for Week Ending March 27, 1948

STOCKS

| | High | Low | Last |
|---|---|---|---|
| Great Northern Paper Co. | 40 | 40 | 40 |
| Taggart Corp. | .... | .... | .... |

CLARK CLAMP LIFT TRUCK

# WHEN CHOOSING A TRUCK *BE SURE* IT HAS

CLARK CLAMP LIFT TRUCK

## DEPENDABLE POWER

## EXIDE-IRONCLAD BATTERIES

have lifting power, hauling power, lasting power . . . when you need it, as you need it, and straight through every shift. This extra power of Exide-Ironclad Batteries is due to a unique construction, which differs from that of all other batteries.

One notable difference is in the positive plate, which consists of a series of slotted tubes containing the active material. So fine are these slots that, while they permit easy access of the electrolyte, they retard the active material from readily washing out.

The results are High Power Ability, High Electrical Efficiency, Ruggedness, Long Life and Low Maintenance. Only Exide-Ironclad Batteries have ALL FOUR of those vital characteristics.

For peak performance and maximum economy, choose the batteries that 81.1%* of electric industrial truck owners prefer—Exide-Ironclad Batteries. **From a recent survey by a leading business publication.*

Write for further particulars and FREE copy of Exide-Ironclad Topics, which covers latest developments in material handling and shows actual case histories.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

## Waste Dealers Elect Danziger President

*(Continued from page 7)*

was endorsed by members to deal with import-export problems particularly those concerned with improper or fraudulent packing. This committee which is to embrace various divisions of the Association will investigate and take action drastic or otherwise on evidence of the genuineness of such mal-practices. There was discussion of the new cutting situation and the competitive effect on the fine paper industry of highcost raw materials.

It was pointed out that the competition of rag-content papers with sulphite papers is becoming keen again, and that the new cutting packers' interest in providing well packed rags and cuttings at reasonable cost to the fine writing industry is an interest identical with that of the mills themselves.

The Council elected the following officers for the ensuing year: President, Julius Levine, New York; first vice-president, Harry R. Woodward; second vice-president, James T. Flannery; treasurer, Arthur Rosenfeld; secretary, Clinton M. White; West Coast advisory committee, David Golub and Jules Glant. New Cuttings, Joseph Schapiro, Baltimore, chairman; Brokers and Repackers, Anthony Licoletti, chairman; Brokers, A. Feierman, chairman; Rope, Strings and Bagging Committee, A. Rosenfeld, chairman; Cotton Rag Importers, Carlton B. Overton, chairman.

A capacity audience was present at the Waste Paper Institute meeting with Harold Shilling, president, in the chair. James Flannery reported on the matter of the Special Trade Practices Committee. Louis Speiss, legal counsel for the Waste Paper Industry Committee, reported briefly on the need for activating the committee again in view of the alarming international situation which brings up the threat of renewed government controls. He also mentioned court decisions pending and effective on transportation matters particularly certain common carrier operations or operations of questionable legality.

Frank Wilcox of Kansas City urged the preservation of good relations with the producers of waste paper to insure a continuance of business relationships and to avoid direct dealings. He enlarged on this subject and cited instances to prove the results of indifferent service to the suppliers of waste.

Sam Hershman of New Haven emphasized the place of quality in today's selling of waste paper. Paper and board manufacturers he urged should be made to understand that the standards of waste paper cannot always be the standards written in the old OPA classifications. The difficulty of determining the presence of certain harmful factors in waste packs, such as wet strength papers for example, was something that should be brought to consumers' attention. He cited particularly the case of book stock.

CLINTON M. WHITE
NAWMD Promotes Him

The question of reactivating the Waste Paper Industry Committee and retain Mr. Speiss as counsel, was discussed at length and methods of financing this effort were proposed. However it was emphasized that this committee is strictly a nation-wide industry affair which members and non-members will support and has no direct connection with the Association as such. In the event that political conditions overseas bring about government intervention in the business again, it was emphasized that this time the entire industry should be prepared.

Officers of the Waste Paper Institute were elected for the ensuing year as follows: President, David Dickson of Philadelphia; vice-president, John Lettellier of New Orleans; secretary, Clinton M. White, and treasurer, Haskell Stovroff of Buffalo.

A meeting of the Metal Dealers Division of the National Association of Waste Material Dealers at the Hotel Statler ended late Tuesday afternoon after discussing non-ferrous problems brought to the convention by representative members.

Clinton White who was elected Division secretary read correspondence with W. E. Sweeney of the Department of Commerce Office of Supply concerning the establishment of Industry advisory committees. The government had indicated its interest in the industry's suggestion that such a Committee be appointed but despite news reports of their intentions to proceed the Department has taken no action, except to state that "their decision would be made known soon."

Officers elected for the ensuing year are as follows: President, Emanuel Hettleman of K. Hettleman & Sons, Baltimore; first vice-president, Leo Selig of J. Sololken, Indianapolis; second vice-president, Hyman Moskowitz of Moskowitz Bros., Cincinnati; third vice-president, Joseph Roth of Roth Bros. Metal Co.; fourth vice-president representing the West Coast, Dolio Shiappari.

The new president promised a vigorous administration given the membership's support.

Officers and directors elected include the following vice-presidents:

James T. Flannery, James T. Flanery Company, Jersey City, N. J.; Harris Goldman, Harris Goldman Co., Inc., New York City; Emanuel Hettleman, K. Hettleman & Sons, Inc., Baltimore, Md.

FOR DIRECTORS FOR THREE YEARS

William Abramson, A. Abramson & Sons, Inc., Newark, N. J.; Jean B. Charak, Federal Paper Stock Co., St. Louis, Mo.; Arthur J. Furth, Pioneer Paper Stock Co., Chicago, Ill.; Henry Lipkowitz, The Atlas Metal Company, Cleveland, Ohio; Stuart B. Sutphin, Jr., The I. V. Sutphin Company, Cincinnati, Ohio; Joseph H. Tyroler, Tyroler Metals, Inc., Cleveland, Ohio.

FOR DIRECTORS FOR TWO YEARS

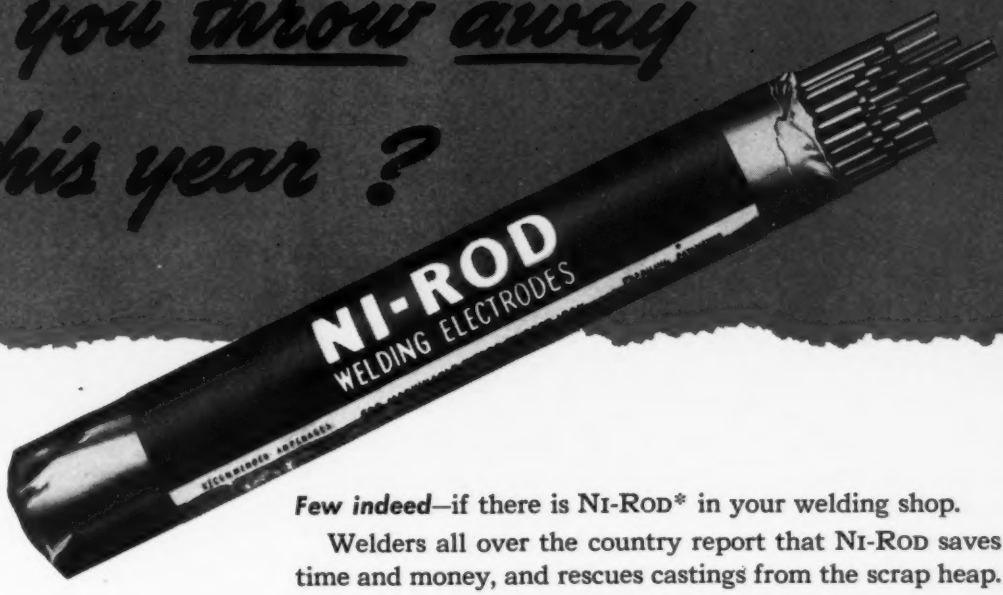
Louis B. Cline, Cline and Bernheim, Nashville, Tenn.; John E. Fitzpatrick, Jos. Rosenthal's Sons, Inc., Philadelphia, Pa.; Morton A. Friedman, L. A. Cohn and Bro., Chicago, Ill.; J. Gluckson, Gluckson Wool Stock Corp., Brooklyn, N. Y.; Peter Kahn, Jr., Philip Senegram Company, Los Angeles, Calif.; Abe Lapides, Lapides Metals Corp., New Haven, Conn.; Louis Marcovitz, Loumar Textile By-Products, Inc., New York City; William J. McCauley, H. Muehlstein & Co., Inc., New York City; William T. McNamee, Penn Paper & Stock Co., Philadelphia, Pa.; Boris Petricoff, The Leshner Corp., Hamilton, Ohio; Philip Scheibner, Associated Iron and Metal Company, Oakland, Calif.; Haskell Stovroff, Buffalo Waste Paper Co., Inc., Buffalo, N. Y.

Directors who continue in office from previous terms include M. F. Berg, Walter T. Clark, James T. Flannery, Egmont L. Frankel, Jules Glant, E. J. Keller, Herman Ladenson, James K. McElligott, Robert Miller, A. Lyons Newman, Carlton B. Overton, Arthur Rosenfeld, Bernard Schapiro, Marshall A. Shapiro, Paul J. White, Ralph O. Williams.

## Robinson Represents Kidder Press

Recent publication of an advertisement of the Kidder Press Company, Dover, N. H., omitted the name of C. P. Robinson, with offices in the Graybar Building at 420 Lexington avenue, New York City. Mr. Robinson, who is widely known in the industry, is special representative to paper mills for the Kidder company.

# How many castings will you throw away this year?




***Few indeed***—if there is NI-ROD* in your welding shop.

Welders all over the country report that NI-ROD saves time and money, and rescues castings from the scrap heap.

NI-ROD makes machinable welds in cast iron . . . joins cast iron to steel . . . makes it easy to repair cracked, porous, and imperfect castings.

Here is what welding men are saying about NI-ROD:

- "NI-ROD'S *ease of handling shortcuts special steps like preheating, and reduces labor time.*"
- "NI-ROD'S *crack-free, non-porous nickel deposit fuses completely with cast iron under the toughest welding conditions.*"
- "NI-ROD'S *smooth flow keeps down hardness.* NI-ROD *welded castings are easy to machine.*"

Try NI-ROD in your own welding shop. Order a five pound package today. Your distributor stocks it in 3/32", 1/8", 5/32" and 3/16" diameters.

*Reg. U. S. Pat. Off.

**THE INTERNATIONAL NICKEL COMPANY, INC.**
**67 Wall Street, New York 5, N. Y.**

EMBLEM OF SERVICE
INCO NI-ROD
TRADE MARK

**GET NI-ROD FROM**

Whitehead Metal Products Company, Inc.
Steel Sales Corp.
Pacific Metals Company, Ltd.
Eagle Metals Co.
Robert W. Bartram, Ltd.
Wilkinson Company, Ltd.
Hollup Corporation
Williams and Company
Metal Goods Corporation
Alloy Metal Sales, Ltd.
Metal & Thermit Corporation
National Cylinder Gas Company

## Empire State TAPPI Discusses Printing

HUDSON FALLS, N. Y.—The requirements for paper used in various printing plants were explained by Gerard Larocque of the New York Daily News in an address on "Modern High Speed Printing of Newspapers and Periodicals" given before the Hudson Valley Chapter of TAPPI at the Kingsbury Hotel on Friday, March 19th. Dr. Larocque pointed out that the printing pressure on modern presses for newspapers is from 200 to 500 pounds per square inch, and that presses run at speeds of from 1,000 to 1,500 feet per minute. The paper is in contact with the printing surface only from a 200th to a 500th part of a second at these speeds, he said.

As the second side of the sheet must be printed within a half to two seconds of the first, the previous side must be dry enough to prevent smudging at this time. This requires a paper which is smooth, level and of proper absorbency, he continued, since newsprint ink made of carbon and oil drys by the oil being absorbed by the paper. He explained how the oil must be absorbed rapidly by spreading in the paper and not going through it.

Other inks discussed and the papers suited to them were oxidation inks, made of pigment, resin and a solvent, and heat set inks composed of glycol and resin. The latter type is for a better type of printing and usually steam dried, he said.

Dr. Larocque went on to describe the early types of rotary presses, method of plate making, duplication of plates by means of the mat-rolling. process and stereo casting, and covered such items as the shaving of plates, method of locking in the press, paper stresses developed at the moment of printing, the use and nature of make-ready and operation of the automatic web tension device. He drew a comparison between the newspaper press and modern high speed mechanical presses such as are used for periodical publications, and stated that absence of defects, sufficient moisture and mechanical strength, absorbency, smoothness, cushion and formation are the characteristics required of groundwood papers for successful printing.

Dr. Larocque dealt with gravure or rotogravure printing processes covering such items as plate preparation, inks and fountain used, early presses and the modern high speed rotary operation and drew a comparison showing the advantages and disadvantages of gravure printing as compared with letterpress work. He discussed briefly the identification of gravure, letterpress and offset printing and concluded his remarks with a study of the requirements of paper to make it suitable for gravure work and how these requirements differ from what is needed for letterpress printing.

Previous to his address Dr. Larocque gave a showing of a new colored film "Trees to Tribunes" in which the papermaking process is followed from the woods near Baie Comeau, Que., to the delivery at the presses of the Chicago Tribune and then follows through the editorial and production departments to the delivery of the finished newspaper to the reader.

Henry Fales, who presided, appointed a nominating committee comprised of V. P. Edwards of Corinth, Foster P. Doane, Jr., of Glens Falls, and Dr. James Foote of Plattsburg to present a slate of officers at the April meeting, date and place to be announced.

## Delaware Valley Discusses Quality

PHILADELPHIA—The Delaware Valley Section of the Technical Association of the Pulp and Paper Industry met at the Engineers Club on Thursday evening, March 25th. John P. Weidner of Container Corporation of America, acting chairman, announced the appointment of A. L. M. Bixler, J. Paciello, and Allen Boyd to serve on the nominating committee.

A discussion of the use of statistics in controlling quality in the paper mill was presented by Charles A. Bicking, quality control engineer, of Hercules Powder Co. Mr. Bicking sketched in a background for his discussion by giving brief definitions of the statistical terms used and described comparative distribution curves with concrete illustrations on the blackboard. The fallacy of depending solely on arithmetic averages was highlighted by showing the net effect of trying to describe the results of various types of shots taken at a sitting duck. Text book references and other useful sources of information to use as a working guide were made available to those present.

Control units to be used in mill control of quality are set up from sufficiently large accumulations of data collected from previous satisfactory runs. Averages of small samples of three or four determinations block out most of the effects of wide deviations between random individual determinations and can be charted to indicate trends due to some change in processing conditions. Considerable time can be saved in recognizing and remedying dangerous trends in product control quickly.

## Cola G. Parker to Address Lake States TAPPI

APPLETON, Wis.—The next meeting of the Lake States Section of the Technical Association of the Pulp and Paper Industry, to be held at the American Legion Club House on Tuesday evening, April 13th at 6:30, will hear Cola G. Parker, president of the Kimberly-Clark Corporation and president of the American Paper and Pulp Association. Mr. Parker will speak on "Economic Trends in the Paper Industry."

## New England TAPPI Hears From Britain

BOSTON—The New England Section of the Technical Association of the Pulp and Paper Industry met at the Statler Hotel, Boston, Mass., on Friday evening, March 19th. Chester H. Child of the Merrimac Paper Company presided as chairman. About 125 attended. W. F. Gillespie of the Gaylord Container Corporation, Bogalusa, La., and president of TAPPI, and R. G. Macdonald, secretary of TAPPI, were introduced and made remarks concerning some of the current projects of the Association.

Werner Kaufmann of Kupfer Bros. Company introduced the first speaker, Eric Harrison, general manager of Harrison & Sons, and Hayes Mill, Ltd. of England, who discussed present business conditions in England. Mr. Harrison's plant was established in 1750 and specializes in packaging labels, British postage stamps, largely in Photogravure.

Out of 550 firms in London, 75 suffered total loss in the Blitz and 200 more suffered partial damage. The labor force is down to 400,000, a reduction of 40,000. Due to shortages there has been but little progress in new building construction.

Most printing is done by the letterpress method, mostly on flat beds. Offset comes second, with photogravure in third place. Out of 8000 printers in Great Britain, 400 of the larger firms employ 50 percent of the total labor, while some 6000 employ less than an average of ten.

The present paper control orders permit the licensing of about 75 percent of the total amount consumed prewar. Newspapers and periodicals use about 30 percent of prewar requirements.

F. A. Strovink of the American Cynamid Company introduced the next speaker, D. J. Andello, in charge of printing for the National Geographic Magazine, who talked on Eveluation of Printing.

Mr. Andello pointed out that paper is the most influential factor in printing. Among the requirements for paper are the following: 1. Uniformity, 2. Smoothness, 3. Ink receptivity (ink to set fast but not to penetrate too much, thereby losing color value), 4. Surface strength (tack for multicolor work), 5. High opacity (to minimize strike through and show through), 6. Uniformity of color (for color printing), 7. Uniformity of thickness, 8. Moisture content (in equilibrium with humidity), 9. Permanency in color and body strength, 10. Cleanliness and good appearance.

The next meeting of the Section will be held at the Roger Smith Hotel, Holyoke, Mass., on April 16th. This meeting is being arranged by F. W. Farrell of McLaurin-Jones Company and will be devoted to special problems of coating.

CENTRIFUGAL PUMPS FOR EVERY SERVICE

# READY TO HELP YOU

## *make your pumping budget DO MORE!*

**YOUR "BUFFALO" REPRESENTATIVE**

knows paper stock pumps from years of training and experience. He's "up" on your problems because of his constant contact with the industry. He's ready to help you, any time you need him.

● *Many an operator* has smoothed out bottlenecks in paper pumping by calling in a "Buffalo" representative. "Buffalo" men have more than know-how. They have a line of pumps for every stock job — pumps designed to handle particular consistencies — particular heads — particular capacity requirements.

The right "Buffalo" pump on your job means lower maintenance costs, lower power costs — high efficiency pumping service for a good many years. And because of the wide selection of types, your "Buffalo" representative can recommend exactly the right one. Call him in, at no obligation.

1000 gpm of white water against 105′ head! That's the job this "Buffalo" Double Suction Pump is doing in a Sulphite mill.

PUMPS by "Buffalo"

For

- ★WATER ANY TEMPERATURE
- ★PAPER STOCKS (NON-CLOGGING)
- ★GENERAL SERVICE
- ★ACIDS
- ★ALKALIS
- ★SLURRY
- ★CONDENSATE RETURN
- ★SUMP CLEARANCE
- ★FIRE SERVICE
- ★SEWAGE
- ★SELF-PRIMING SERVICE

# BUFFALO PUMPS, INC.

159 MORTIMER STREET — BUFFALO, N. Y.

Canada Pumps Ltd., Kitchener, Ont.

RUGGED, PRECISION CONSTRUCTION—FOR LONG LIFE

# IMPORTS

## NEW YORK IMPORTS

WEEK ENDING MARCH 27, 1948

| | |
|---|---|
| Newsprint | 1708 rolls |
| Printing Paper | 44 cs. |
| Tracing Cloth | 13 cs. |
| Tissue Paper | 54 cs. |
| Gummed Paper | 52 cs. |
| Copying Paper | 20 cs. |
| Photo Paper | 4 cs. |
| Drawing Paper | 6 cs. |
| Filter Paper | 35 cs. |
| Paper Napkins | 2 cs., 9 bls. |
| Wallpaper | 1 cs. |
| Mimeograph Paper | 6 cs. |
| Boxboard | 111 rolls |
| Wrapping Paper | 4526 rolls |
| Sulphite Paper | 382 rolls |
| Miscellaneous Paper | 455 rolls |

### NEWSPRINT

Gilman Paper Co., Gripsholm, Gothenburg, 151 rolls.

Madden Reeve Angel & Co. Inc., Stegeholm, Hango, 1557 rolls.

### PRINTING PAPER

Stevens Nelson Paper Corp., Vandalia, London, 2 cs.

Olympic Shipping Co., Fordham Victory, Havre, 42 cs.

### TRACING CLOTH

Keuffel & Esser Co., American Importer, Liverpool, 12 cs. (cotton) 1 cs. (process).

### TISSUE PAPER

B. F. Drakenfeld & Co., American Importer, Liverpool, 54 cs.

### GUMMED PAPER

B. F. Drakenfeld & Co., American Importer, Liverpool, 52 cs.

### COPYING PAPER

Stevens Nelson Paper Corp., Indian Navigator Yokohama, 20 cs. (machine made).

### PHOTO PAPER

(———), Vandalia, London, 4 cs.

### DRAWING PAPER

H. Reeve Angel & Co., Inc., Vandalia, London, 3 cs.

H. Reeve Angel & Co., Inc., America, Southampton, 3 cs.

### FILTER PAPER

H. Reeve Angel & Co., Inc., Vandalia, London, 25 cs.

E. H. Sargent & Co., Gripsholm, Gothenburg, 5 cs.

H. Reeve Angel & Co., Inc., America, Southampton, 5 cs.

### PAPER NAPKINS

American Express Co., Vandalia, London, 2 cs.

H. W. Robinson & Co., Vandalia, London, 9 bls.

### WALLPAPER

Meadows Wye & Co., Vandalia, London, 1 cs.

### MIMEOGRAPH PAPER

U. N. Trans. Service, Agwiking, Havana, 6 cs.

### BOXBOARD

Jay Madden Corp., Tidaholm, Hango, 111 rolls.

### WRAPPING PAPER

Jay Madden Corp., Stegeholm, Hango, 2356 rolls.

Manufacturers Trust Co., Gripsholm, Gothenburg, 204 rolls.

Sterling National Bank Trust Co., Gripsholm, Gothenburg, 93 rolls.

Bulkley Dunton Paper Co., Gripsholm, Gothenburg, 1873 rolls (sulphite).

### SULPHITE PAPER

Resolute Paper Products Corp., Gripsholm, Gothenburg, 104 rolls.

National City Bank, Gripsholm, Gothenburg, 74 rolls.

Chemical Bank Trust Co., Gripsholm, Gothenburg, 88 rolls.

Marine Midland Trust Co., Gripsholm, Gothenburg, 116 rolls.

### MISCELLANEOUS PAPER

H. Reeve Angel & Co., Inc., Gripsholm, Gothenburg, 99 rolls.

Whitehall Shipping Co., Gripsholm, Gothenburg, 48 rolls.

Resolute Paper Products Corp., Gripsholm, Gothenburg, 185 rolls.

Parsons & Whittemore, Inc., Gripsholm, Gothenburg, 123 rolls.

### RAGS, BAGGINGS, ETC.

1st National Bank Chicago, Rossia, Odessa, 379 bls. cotton waste.

Irving Trust Co., Kong Haakon, Alexandria, 148 bls. old bagging pieces.

National City Bank, Kong Haakon, Alexandria, 210 bls. old hessian bagging.

(———), Kong Haakon, Alexandria, 207 bls. hessian tares, 80 bls. old bagging, 57 bls. bagging.

National Bank Detroit, Kong Haakon, Alexandria, 158 bls. jute tentage.

National City Bank, Kong Haakon, Istanbul, 2066 bls. cotton rags.

Irving Trust Co., Executor, Alexandria, 47 bls. old bagging pieces.

E. J. Keller Co., Inc., Executor, Alexandria, 35 bls. old ressians, 193 bls. old bagging.

J. P. Fleising Co., Executor, Naples, 148 bls. dark cotton rags.

Harris Goldman Co., Executor, Leghorn, 183 bls. cotton rags.

A. W. Fenton Co., Inc., Executor, Leghorn, 86 bls. old cotton rags.

E. J. Keller Co., Inc., Executor, Leghorn, 134 bls. old scrap bagging.

(———), Executor, Leghorn, 116 bls. gunny bagging.

Manufacturers Trust Co., Executor, Leghorn, 250 bls. old waste bagging.

Chase National Bank, Executor, Leghorn, 76 bls. old waste bagging.

Banzl & Bianchi, Executor, Leghorn, 110 bls. jute rags.

Loumar Textile By Products Co., American Importer, Liverpool, 43 bls. bagging.

S. L. Ayres Co., Marine Flier, Cochin, 100 bls. cotton waste.

Camden Fiber Mills, Marine Flier, Cochin, 50 bls. cotton waste.

Brandwein Mazur Co., Marine Flier, Cochin, 200 bls. cotton waste.

M. O. Schimmel Corp., Marine Flier, Cochin, 225 bls. cotton waste.

Castle & Overton, Inc., Marine Flier, Cochin, 102 bls. jute rags.

Lush Cotton Products Co., Marine Flier, Cochin, 100 bls. cotton waste.

Brandwein Mazur Co., Pres. Polk, Bombay, 700 bls. cotton waste.

J. P. Fleising Co., Silveroak, Naples, 178 bls. dark cottons.

A. W. Fenton Co., Inc., Silveroak, Naples, 80 bls. old white cotton rags.

### GLUESTOCK

(———), A. Mitchell Palmer, Buenos Aires, 71 bls.

### CASEIN

American Cyanamid Co., Paul Revere, Buenos Aires, 601 bags (ground rennet).

Union Bank Australia, Kaikoura, Sydney, 480 bags.

Casein Co. of America Div. The Borden Co., Uruguay, Buenos Aires, 1100 bags.

Hercules Powder Co., Villar, Buenos Aires, 1000 bags.

F. Griffen, (Montreal), City of Stafford, Auckland, 50 bags (ground lactic).

### WOODPULP

The Borregaard Co., Inc., Stavangerfjord, Oslo, 175 bls. dry bleached sulphite pulp.

Stora Kopparberg Corp., Gripsholm, Gothenburg, 862 bls. dry chemical pulp.

### WOODPULP BOARDS

Jay Madden Corp., Todaholm, Hango, 1453 rolls (solid white).

## BOSTON IMPORTS

WEEK ENDING MARCH 27, 1948

Green Textile Associates, Marine Flier, Bombay, 100 bls. cotton waste.

Castle & Overton, Inc., Marine Flier, Leghorn, 192 bls. dark cotton rags.

Elof Hansson, Inc., Blommersdyk, Rotterdam, 195 rolls newsprint.

## PHILADELPHIA IMPORTS

WEEK ENDING MARCH 27, 1948

Leigh Textile Co., American Importer, Manchester, 126 bls. bagging.

H. Adlerstein, Executor, Genoa, 47 bls. light cotton rags.

Jay Madden Corp., Tidaholm, Hango, 759 rolls wrapping paper.

Madden Reeve Angel & Co., Inc., Tidaholm, Hango, 402 rolls newsprint.

Pulp Sales Corp., Tidaholm, Hango, 2175 bls. unbleached prime strong sulphite pulp.

## BALTIMORE IMPORTS

WEEK ENDING MARCH 27, 1948

Madden Reeve Angel & Co., Stegeholm, Hango, 1231 rolls newsprint.

Pulp Sales Corp., Stegeholm, Hango, 1700 bls. prime unbleached kraft sulphate pulp, 2974 bls. prime unbleached strong sulphite pulp, 610 bls. prime unbleached sulphite pulp, 1412 bls. prime unbleached strong bleachable sulphite pulp.

## TAMPA IMPORTS

WEEK ENDING MARCH 27, 1948

Madden Reeve Angel & Co., Tidaholm, Hango, 1210 rolls newsprint.

# CUT DOWN HEAD BOX DILUTION

Close-up of Installation on Head Box Wall

# NEW BROUGHTON HEAD BOX SHOWER

## *PAYS FOR ITSELF IN WATER SAVINGS*

**Performs efficiently with only a small volume of water. This latest development in low volume, high pressure showers does double duty. It *keeps* head box sides and ends washed down and also acts as a foam killer.**

**Just one set of spray nozzles rotating in an arc, varying as required, does the job. Results have been especially successful on kraft machines and highly sized stocks.**

**Write for detailed prints showing ease of installation.**

## A. E. BROUGHTON & COMPANY

**GLENS FALLS, N. Y.**

**Midwest Representatives, RONNINGEN ENGINEERING SALES, Vicksburg, Mich.**
**Canadian Representatives, SHERBROOKE MACHINERIES LTD., Sherbrooke, Quebec.**
**Mfd. and Sold in Europe by INGENIORSFIRMAN FLIESBERG AKTIEBOLAG, Stockholm 7, Sweden.**

**Also manufacturers of Broughton Unit Vacuum Control Systems for Flat Boxes, and Hydraulically Oscillated Showers for cleaning Cylindrical Screens, Cylinder Moulds, Felts, Fourdriniers, etc.**

# TRENDS

Office of the PAPER TRADE JOURNAL,
Wednesday, March 31, 1948.

Paper is one of the several commodity fields where a return to competition is underway, in the opinion of the Forest Products Section of the United States Department of Commerce. Many paper merchants who a month or two ago had expected a big increase in orders and a continuation of a seller's market are today reversing themselves in preparation for a buyer's market. Already a few paper and converted paper product items have entered the field of competition. Similar to other commodity lines, this change-over in conditions will apparently take place item by item over a period of months so that no serious or sharp overall repercussions are to be anticipated in the near future. In other words, the paper market situation seems to be adjusting itself in an orderly manner as supply catches up with demand and buyers become more critical and cautious of both quality and price.

Notwithstanding the more cautious attitude of wholesale paper merchants and paper consumers who for the first time since the war are now discerning and cognizant of prices and quality, the report continues, they foresee a good market ahead. In fact the feeling prevails that as competition increases in other commodity lines, paper will enter the picture even more strongly in the selling of such products through advertising and improved packaging.

### Pulpwood

A development of considerable benefit not only to the pulp and paper industry of the Pacific Northwest but also to the nation's over-all wood pulp supply is the recently announced decision of the Canadian government to double the 1948 export allocation to the United States from Crown Grant lands in British Columbia of fir, hemlock and balsam logs. The annual allocation which during the war and through 1947 was 50 million board feet has been raised for 1948 to 100 million, of which 17.5 million feet will be fir and 82.5 million the pulping species of hemlock and balsam. This increase will provide potential imports of about 137,000 cords of pulpwood from British Columbia, as compared with approximately 54,000 cords hitherto available. The adjustment was arrived at, according to the Department of Commerce report, after prolonged negotiation between the U. S. Government and that of Canada. That the Canadian Government has finally agreed to a doubling of the quota is an outstanding instance of the efficacy of friendly cooperation.

With regard to the Ontario Government's announced policy to reduce and eventually eliminate exports of pulpwood cut on Crown lands and owned by the Province of Ontario—which would put limitations on pulpwood exports to the United States for three, four or ten year periods depending on certain arrangements with individual U. S. companies—current reports indicate that some additional time is being extended to these companies so as to cause less hardship while these firms can be seeking new sources of pulpwood upply.

### Wood Pulp

The gradual return of competitive pricing as well as higher qualities in some segments of the industry is making it increasingly difficult for the nonintegrated mills to utilize profitably the higher priced overseas pulp. Some of these mills have limited their weekly production schedules to five days so they may restrict their pulp consumption in large measure to the less costly domestic and Canadian pulps. This enables them to offer their products on a more advantageous basis with their competitors in the integrated field. The rebellion of some nonintegrated mills against north European price levels is reflected in the efforts of the Swedish government and the Swedish pulp industry to reach a decision on the latter's efforts looking toward discontinuance of the "business equalization" tax which now adds approximately $15 per ton to the export price of Swedish pulp and would add $20 in the event their Government's proposed increase of 25 percent is effected.

### Index

The index of general business activity for the week ended March 20 receded to 147.9 from 151.4 in the preceding week, compared with 146.7 for the corresponding week of 1947. Index of paperboard production was 189.3 compared with 187.3 in the preceding week and with 174.5 in the corresponding week of 1947.

Paper production for the week ended March 20 was estimated at 103.1 percent compared with 100.9 (revised) for the preceding week, with 105.8 for the corresponding week of 1947, with 105.0 for 1946, and with 92.1 for the corresponding week of 1945.

Paperboard production for the week ended March 20 was 104.0 percent of capacity, compared with 102.0 for the preceding week, with 103.0 for the corresponding week of 1947, with 99.0 for 1946, and with 99.0 for the corresponding week of 1945.

## Soda Industry Acts To Reach Agreement

WASHINGTON—Soda ash and caustic soda producers have agreed to form an industry committee to consider a voluntary agreement for their industry, following a meeting with John C. Virden, director of the Department of Commerce Office of Industry Cooperation. This agency is engaged in development of voluntary industry agreements which were called for by Public Law 395, as a substitute for the return to war-time controls originally proposed by the Administration.

If the soda ash and caustic soda producers accept such an agreement it will put them among the first to do so, according to information from other sources which indicates that only a few major industrial groups have so far completed these agreements, under the new law.

Members of the industry meeting with Mr. Virden included both major and smaller producers, from all areas of the industry, it was said. Problems affecting both domestic and foreign distribution of the two commodities were discussed.

Among those at the meeting were: E. M. Kolb, American Potash & Chemical Corp.; K. B. Stuart, Manager, Colorado Fuel & Iron Corporation, Chemical Sales Division; W. H. McConnell, Director of Sales, Diamond Alkali Company; K. M. Wildes, Head of Alkali Div., Dow Chemical Company; Daniel Townend. President, Fields Point Manufacturing Co.; Robert E. Wilkin, Eastern Sales Mgr., Hooker Electrochemical Co.; E. E. Routh, Vice President, Mathieson Alkali Works, Inc.; S. W. Jacobs, Vice President, Niagara Alkali Company; R. S. Roeller, Pennsylvania Salt Manufacturing Co.; Chad F. Calhoun, Vice President, Permanente Products Corporation; W. I. Galliher, Executive Sales Manager, Chemical Div., Pittsburgh Plate Glass Company; A. B. Chadwick, President, Solvay Sales Corporation; T. A. Haschke, Sales Manager, Stauffer Chemical Company; Kenneth B. Ray, John D. Meyler, Westvaco Chlorine Products Corp.; Bert Cremers, Vice President, Wyandotte Chemicals Corporation.

## Foster Wheeler Elects Frisch

NEW YORK — Martin Frisch, vice-president in charge of engineering of Foster Wheeler Corporation, has been elected a director of the corporation. Mr. Frisch joined the company in 1929 and was elected a vice-president last year.

Lee Allen Swem, a director of the company, and assistant to the president for the past three years, was elected a vice-president. Mr. Swem became associated with the company in 1936 as patent counsel.

CALL ON CROLOY

# STAINLESS STEEL
## *Seamless and Welded*
# TUBES

**for superior corrosion resistance and strength**

When paper-making processes call for tubes with high resistance to severely corrosive solutions, call on these . . . . . B&W Croloys. They were developed to help solve this problem in the paper industry . . . so they fit your requirements as only tailor-made tubes can.

For the sulphate or Kraft process B&W offers Croloy 18-8-S, for the sulphite process, B&W offers the molybdenum containing stainless steels Croloy 16-13-3, 18-13-3, and 16-13-3 Cb. Their time-saving cost-cutting advantages have been convincingly demonstrated in a wide variety of severe service conditions.

B&W can supply these Croloy analyses in both Seamless and Welded tubes. Perhaps they will solve tough tubing problems for you as they have for others. So ask today for full information.

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Seamless and Welded Tubular Products in a full range of Carbon, Alloy, and Stainless Steels for All Pressure and Mechanical Applications.

★ ★ ★

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Stationary and Marine Boilers . . . Boiler Components . . . Pulverizers . . . Fuel Burning Equipment . . . Refractories . . . Chemical Recovery Units . . . Process Equipment . . . Alloy Castings.

**BABCOCK & WILCOX**
**SEAMLESS & WELDED TUBES**
THE BABCOCK & WILCOX TUBE COMPANY
GENERAL OFFICES: BEAVER FALLS, PA.
PLANTS: BEAVER FALLS, PA. AND ALLIANCE, OHIO.

# PRICES

With the elimination of price controls on paper, pulp, rags and other materials, the quotations given below once more become indicative of trends in an open market. At the moment they can be of little more, for, while some volume business still is being done under contract at the figures given below, fluctuations representing special conditions are to varied and too frequent to permit prices to be given as representing a wholly stabilized market.

## Paper

(Delivered New York)

Standard News, per ton—
Rolls, contract .... $93.00/$96.00
Sheets ..... 102.50/109.00

Kraft—per cwt.—Carload Quantities Zone A Deld. 40 lb. base wgt.
Superstandard Wrapping ..... $9.00/ —
No. 1 Wrapping .... 7.25/ 8.00
Standard Wrapping .. 6.50/ —
Standard Bag ..... 6.50/ —

Tissues—Per Ream 24x36 (480) 11 lb. Zone 1.
Wh. No. 1 Frd. .... $1.84/$2.00
Wh. No. 1 M. G. ... 1.94/ 2.00
Wh. No. 1½ ..... 1.60/ —
Wh. No. 2 ..... 1.75/ —
Kraft Anti-Tar ..... 1.65/ —
Kraft Unbl. ..... 1.85/ —
Manila No. 2 ..... 1.62/ —
Shred. Wh. No. 1 cwt. 1.10/ 1.50

Toilet—Per Case of 100 rolls—1 M Sheets.
Unbleached ..... $8.50/$10.00
Bleached ..... 8.50/ 10.00

Paper Towels—Per Case of 3750—Zone 1.
Wh. Jr. M'tif'd 9¼x9½ .. $5.15
Br. Sr. M'tif'd 10x12 ..... 3.60
Br. Jr. M'tif'd 9½x9¾ ... 3.10
Br. Jr. Sgl. fold 10x10¾ .. 3.15

Manila—per cwt.—C-l. f.a.
No. 1 Jute Tag ... $14.50/ —
Reg. Jute Manila . 13.25/$15.50
No. 1 Manila .... 9.75/ —

Boards, per ton—
Plain News ..... $92.50/ —
Filled News ..... 94.00/ —
Plain Chip ..... 90.00/ —
Sgl. Mla. J-d. Chip* 100.00/102.50
White Pat. coated* 120.00/ —
Kraft Liners 42 lb. 100.00/ —
Kraft Corr. .009 .. 105.00/ —
Binders Boards ... 126.00/ —
* Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following prices are representative of distributors' resale prices, all deliveries in Zone 1; Rag Content Bonds and Ledgers—

White, Assorted Items

| Bonds, per cwt. | Carton | 4 C't'n | Ton |
|---|---|---|---|
| 100% Rag Ext. No. 1 ..... | $55.00 | $50.80 | $48.70 |
| 100% Rag ... | 48.25 | 44.55 | 42.70 |
| 75% Rag .... | 37.50 | 34.55 | 33.10 |
| 50% Rag .... | 32.25 | 29.40 | 28.25 |
| 25% Rag .... | 28.75 | 26.15 | 25.10 |

Ledgers, per cwt.

| | | | |
|---|---|---|---|
| 100% Rag Ext. No. 1 ..... | $55.00 | $50.80 | $48.70 |
| 100% Rag ... | 48.25 | 44.55 | 42.70 |
| 75% Rag .... | 37.50 | 34.55 | 33.10 |
| 50% Rag .... | 32.25 | 29.40 | 28.25 |
| 25% Rag .... | 28.75 | 26.15 | 25.10 |

Sulphite Bonds and Ledgers—
White, Assorted Items

| Bonds, per cwt. | | | |
|---|---|---|---|
| No. 1 ..... | $21.25 | $19.25 | $18.50 |
| No. 2 ..... | 20.25 | 18.30 | 17.55 |
| No. 4 ..... | 19.25 | 17.55 | 16.85 |

Ledgers, per cwt.

| | | | |
|---|---|---|---|
| No. 1 ..... | $21.75 | $19.65 | $18.85 |
| No. 2 ..... | 20.75 | 18.75 | 18.05 |
| No. 4 ..... | 20.00 | 18.10 | 17.35 |

Free Sheet Book Papers—
White, Cased Paper

| (Per cwt.) | Case | Ton |
|---|---|---|
| No. 1 Glossy Coated . | 20.40 | $19.50 |
| No. 2 Glossy Coated . | 19.15 | 18.30 |
| No. 3 Glossy Coated . | 18.40 | 17.60 |

| (Per cwt.) | Case | Ton |
|---|---|---|
| No. 1 Antique (Watermarked) ..... | $15.90 | $15.15 |
| No. 2 Offset ..... | 15.15 to 17.90 | 14.60 to 17.10 |
| A Grade E. F. ..... | 14.90 | 14.25 |
| A Grade S. & S. C. . | 15.40 | 14.65 |
| B Grade E. F. ..... | 13.90 | 13.30 |
| B Grade S. C. ..... | 14.40 | 13.70 |

## Wood Pulp

Domestic mill contract prices delievered with varying freight allowances.

| | Per Short ADT |
|---|---|
| Groundwood ..... | $80.00/$81.00 |
| Unbleached Sulphite . | 124.00/ — |
| Bleached Sulphite ... | 125.00/135.00 |
| Bleached Soda ..... | 130.00/ — |
| Bleached Sulphate ... | 175.00/185.00 |
| Unbleached Sulphate Northern ..... | 125.00/155.00 |
| Unbleached Sulphate Southern ..... | 130.00/145.00 |

### Canadian Quotations

Prices delivered with varying freight allowances unless otherwise specified:

| | Per Short ADT |
|---|---|
| Reg. No. Kraft ..... | 125.00/ — |
| Unbleached Sulphite . | 125.00/126.00 |
| Bleached Sulphite ... | 125.00/135.00 |
| Glassine Unbleached Sulphite (no freight allowance) ..... | 120.00/ — |
| Bleached Soda ..... | 130.00/ — |
| Groundwood ..... | 80.00/ 85.00 |
| Sideruns Pulping News | 80.00/ — |
| Hardwood and Specialty Grades ..... | Nominal |

### Swedish Quotations

On dock, Atlantic Ports

| | Per Short ADT |
|---|---|
| Bleached Kraft ..... | 175.00/185.00 |
| Bleached Sulphite ... | 175.00/185.00 |
| Unbleached Sulphite . | 145.00/175.00 |
| Unbleached Kraft ... | 140.00/165.00 |

### Finnish Quotations

On dock, Atlantic Ports

| | Per Short ADT |
|---|---|
| Bleached Sulphite ... | $185.00/ — |
| Unbleached Sulphite . | 155.00/157.00 |
| Unbleached Sulphate | 147.50/ — |

## New Domestic Cotton Cuttings

(F.O.B. Shipping Point Plus Dealer's Commision)

| | |
|---|---|
| White Shirt ..... | $12.00/$12.50 |
| Unbleached Muslin ... | 12.00/ 12.50 |
| Light Silesias ..... | 9.00/ 9.25 |
| White Back Blue Overalls .. ..... | 9.00/ 9.50 |
| Blue Overalls ..... | 8.00/ 8.25 |
| Fancy Shirt ..... | 6.00/ 6.25 |
| Light Percales .. .... | 8.50/ 8.75 |
| Light Prints ..... | 7.50/ 7.75 |
| No. 1 Washables .... | 5.00/ 5.25 |
| Bleachable Khaki .... | 7.50/ 8.00 |
| Unbleachable Khaki .. | 6.50/ 7.00 |
| Cottonades ..... | 5.50/ 5.75 |

## Old Domestic Cotton Rags

(F.O.B. Shipping Point Plus Dealer's Commission)

| | Per 100 lbs. |
|---|---|
| No. 1 Whites Repacked | $5.50/ $6.00 |
| No. 1 Whites Miscellaneous ..... | 4.50/ 5.00 |
| No. 2 Whites Repacked | 3.50/ 3.75 |
| No. 2 Whites Miscellaneous ..... | 3.00/ 3.50 |
| Blue Overalls ..... | 3.75/ 4.00 |
| Thirds and Blues Repacked ..... | 3.25/ 3.50 |
| No. 1 Roofing Rags .. | 2.10/ 2.15 |
| No. 2 Roofing Rags .. | 1.90/ 2.00 |
| No. 3 Jute Bagging .. | 1.75/ 1.85 |
| No. 4 Brussels and hard back carpets .. | 1.75/ 1.85 |
| No. 5A Roofing Rags . | 1.75/ 1.85 |

## New Foreign Cotton Cuttings

(Prices to Mill, F.O.B. Dock, N.Y.)

| | Per 100 lbs. |
|---|---|
| New Dark Cuttings .. | $5.50/ $5.75 |
| New Mixed Cuttings .. | 6.25/ 6.50 |
| Light Silesias ..... | 9.25/ 9.50 |
| Light Flannelettes .... | 9.25/ 9.50 |
| New White Cuttings .. | 12.00/ 13.00 |
| New Unbleached Cuttings ..... | 12.25/ 13.00 |
| Fancy Shirt Cuttings . | 6.50/ 7.00 |
| Light Prints ..... | 7.75/ 8.00 |
| Bleachable Khaki, No. 1 | 7.00/ 7.50 |
| Unbl. Khaki, No. 1 .. | 6.25/ 6.75 |

## Old Foreign Rags

(Prices to Mill, f.o.b. dock, N.Y.)

| | Per 100 lbs. |
|---|---|
| No. 1 White Linens .. | $14.00/$16.00 |
| No. 2 White Linens .. | 12.00/ 13.00 |
| No. 3 White Linens .. | 8.00/ 9.00 |
| No. 4 White Linens .. | 8.00/ 9.00 |
| No. 1 White Cottons .. | 8.00/ 10.00 |
| No. 2 White Cottons .. | 7.00/ 8.00 |
| No. 3 White Cottons .. | 6.00/ 6.50 |
| No. 4 White Cottons .. | 4.00/ 4.50 |
| Extra Light Prints ... | 6.50/ 7.00 |
| Old Light Prints ..... | 4.50/ 5.00 |
| Med. Light Prints .... | 4.00/ 4.50 |
| Dutch Blue Cottons ... | 5.25/ 5.50 |
| Checks and Blues .... | 4.00/ 4.25 |
| Linsey Garments ..... | 2.60/ 2.75 |
| Dark Cottons, European | 2.50/ 2.60 |
| Dark Cottons, Egyptian | 3.00/ 3.25 |
| Old Shopperies ..... | 2.20/ 2.30 |
| New Shopperies ..... | 2.40/ 2.50 |

## Bagging

(Prices to Mill, f.o.b. N.Y.)

| | Per 100 lbs. |
|---|---|
| Foreign Gunny, No. 1 | $6.00/ $6.50 |
| Domestic Gunny, No. 1 | 6.25/ 6.50 |
| Light Wool Tares .... | 6.25/ 6.50 |
| Heavy Wool Tares ... | 6.00/ 6.25 |
| No. 1 Scrap Bagging .. | 5.50/ 5.75 |
| Roofing Bagging ..... | 2.00/ 2.25 |
| Foreign Manila Rope .. | 6.00/ 6.75 |
| Domestic Manila Rope | 6.50/ 6.75 |
| Jute Strings ..... | 5.00/ 5.25 |
| No. 1 Sisal Strings .. | 5.25/ 5.50 |
| Mixed Strings ..... | 1.75/ 2.50 |

## Waste Paper

Base Prices to Mills for Average Packings
(Dollars Per Ton)
F.o.b. New York, Baled

| | |
|---|---|
| No. 1 Hard White Envelope Cuts, one cut ..... | $155.00/$165.00 |
| No. 1 Hard White Envelope Cuts ... | 145.00/ 155.00 |
| No. 1 Hard White Shavings, unruled | 145.00/ 155.00 |
| No. 1 Hard White Shavings, ruled .. | 110.00/ 130.00 |
| Soft White Shavings, one cut ..... | 145.00/ 155.00 |
| No. 1 Soft White Shavings ..... | 135.00/ 145.00 |
| Soft White Shavings, Misc. ..... | 125.00/ 135.00 |
| No. 1 Fly Leaf Shavings ..... | 45.00/ — |
| No. 1 Groundwood Fly Leaf Shavings ... | 35.00/ — |
| N. 1 Heavy Books & Magazines ..... | 25.00/ 26.00 |
| Mixed Books ..... | 15.00/ 18.00 |
| No. 1 White Ledger | 80.00/ 85.00 |
| Manila Tab. Cards . | 9.50/ 11.00 |
| New Manila Envelope Cuttings, one cut . | 100.00/ 110.00 |
| New Manila Envelope Cuttings ..... | 65.00/ 75.00 |
| Extra Manilas ..... | 25.00/ 30.00 |
| Mixed Kraft, Env. & Rag Cuttings .... | 75.00/ 85.00 |
| Kraft Envelope Cuttings ..... | 110.00/ — |
| Triple Sorted, No. 1 Brown Soft Kraft | 65.00/ 75.00 |
| New Kraft Corrugated Cuttings ... | 75.00/ 80.00 |
| No. 1 Assorted Old Kraft ..... | 50.00/ 55.00 |
| New Jute Corrugated Cuttings ..... | 27.00/ — |
| Old 100% Kraft Corrugated Containers | 45.00/ 50.00 |
| No. 1 News ..... | 14.00/ 15.00 |
| No. 1 Mixed Papers . | 10.00/ 11.00 |
| Box Board Cuttings . | — / — |
| White Blank News . | 75.00/ 85.00 |
| Overisue News .... | 23.00/ 24.00 |
| Old Corrugated ..... | 23.00/ 25.00 |
| Mill Wrappers ..... | 22.00/ 24.00 |

## Twines

All Prices Nominal, F.o.b. Mill

(Soft Fiber)

| | |
|---|---|
| Coarse Polished— | |
| India ..... | .33¾/ .35 |
| Fine India ..... | .38¾/ .42½ |
| Fine Polished | |
| Unpolished— | |
| Paper Makers .... | .28¾/ .30¾ |
| Tube Rope ..... | .29 / .31½ |
| Wrapping ..... | .32 / .35¾ |
| Cotton ..... | .63¾/ .66¾ |

(Hard Fiber)

| | |
|---|---|
| Mex. Sisal ..... | .21 / .27 |
| Manila (Reprocessed) | .30 / .32 |

(American Hemp)

| | |
|---|---|
| Polished Hemp .... | .36¾/ .60 |
| Unpolished ..... | .32¾/ .54 |

# PHILADELPHIA

## Domestic Rags (New)

(F.O.B. Eastern Shipping Point)

| | |
|---|---|
| Shirt Cuttings— | |
| New White No. 1 | .11 / .12 |
| New White No. 2 | nominal |
| Light Silesias .... | .07½/ .08 |
| Black Silesias, soft | .06½/ .07 |
| New Unbleached .. | .10½/ .11¼ |
| Washable Prints . | .06½/ .07 |
| Washable No. 1 .. | .05 / .05½ |
| Blue Overall ..... | .07½/ .08 |
| Cotons—According to grades— | |
| Washable Shredding | .03½/ .04 |
| Fancy Percales .. | .06¾/ .07¼ |
| New Black Soft .. | nominal |
| Khaki Cuttings— | |
| Unbleachable Cotton Cuttings ... | .06 / .06½ |
| Bleachable Cotton Cuttings ..... | .07 / .07½ |
| Men's Corduroy ... | .05½/ .06 |
| Ladies' Corduroy . | .05 / .05½ |
| Cottonades ..... | .05½/ .06 |

## Domestic Rags (Old)

(F.O.B. Eastern Shipping Point)

| | |
|---|---|
| White No. 1 —Repacked ..... | 4.50 / 5.00 |
| Mixed White ..... | 4.00 / 4.25 |
| White No. 2—Repacked ..... | 3.50 / 3.75 |
| Thirds and Blues— | |
| Miscellaneous .... | 2.25 / 2.50 |
| Repacked ..... | 2.75 / 3.00 |
| Roofing Stock— | |
| Foreign No. 1 .. | nominal |
| Domestic No. 1 .. | 1.85 / 1.90 |
| Domestic No. 2 .. | 1.75 / 1.80 |
| Roofing Bagging .. | 1.65 / 1.70 |
| Old Manila Rope .. | 6.25 / 6.50 |

## Bagging

(F.O.B. Eastern Shipping Point)

| | |
|---|---|
| Gunny No. 1— | |
| Foreign ..... | nominal |
| Domestic ..... | 4.75 / 5.25 |
| No. 1 Clean Bright— | |
| Sisal Strings .... | .04½/ .05 |
| No. 2 Clean Bright— | |
| Sisal Strings .... | .03½/ .04 |
| Sisal Jute ..... | .02¼/ .03 |
| Scrap— | |
| No. 1 ..... | 5.00 / 5.50 |
| No. 2 ..... | 2.50 / 3.00 |

# Weird

**You'll never see things like these**

**in your sleep when you operate a *Langston.***

**Day after day, year after year these sturdy machines**

**turn out solid, clean cut rolls of superior quality.**

**Maintenance and repair costs ? Mighty low !**

**Samuel M. Langston Company,**

**Camden, New Jersey.**

# Langston

**SLITTERS AND ROLL WINDERS**

| | | |
|---|---|---|
| Wol Tares, heavy .. | 4.75 | / 5.00 |
| New Burlap Cuttings | 6.00 | / 6.50 |

### Old Papers

(F. o. b. Phila.)
Mill Prices, Baled

| | | |
|---|---|---|
| No. 1 Hard White Envelope Cuts, one cut | $100.00 | /$115.00 |
| No. 1 Hard White Shavings, unruled . | 100.00/ | — |
| Soft White Shavings, One cut | 90.00/ | 95.00 |
| White Blank News . | 75.00/ | — |
| Soft White Shavings | 80.00/ | — |
| No. 1 White Ledger | 85.00/ | 90.00 |
| Ledger, Colored | 70.00/ | 72.00 |
| No. 1 Heavy Books & Magazines | 24.00/ | 26.00 |
| Overissue Magazines | nominal | |
| New Manila Envelope Cuttings | 80.00/ | — |
| No. 1 Assorted Old Kraft | 60.00/ | 65.00 |
| No. 1 Mixed Paper . | 11.00/ | 12.00 |
| Box Board Cuttings . | 10.00/ | 11.00 |
| Kraft Corrugated Cuttings | 90.00/ | 100.00 |
| Old Corrugated | 24.00/ | 26.00 |
| Overissue News | 20.00/ | 22.00 |
| No. 1 News | 13.00/ | 15.00 |

## BOSTON

### Old Papers

(F. o. b. Boston)
Mill Prices, Baled

| | | |
|---|---|---|
| No. 1 Hard White Shavings, unruled . | 6.25 | / 6.75 |
| No. 1 Hard White Shavings, ruled .. | 6.00 | / 6.50 |
| Soft White Shavings, Misc. | 6.00 | / 6.25 |
| No. 1 Fly Leaf Shavings | — | / — |
| No. 2 Fly Leaf Shavings | 4.25 | / — |
| No. 1 Groundwood Fly Leaf Shavings | 1.75 | / 2.00 |
| No. 2 Groundwood Fly Leaf Shavings | 1.50 | / 1.75 |
| Mixed Colored Shavings | 2.00 | / 2.25 |
| New Manila Envelope Cuts, one cut | 4.50 | / 4.75 |
| Hard White Envelope Cuts, one cut | 7.00 | / — |
| Triple Sorted No. 1 Brown Soft Kraft | 3.75 | / 4.00 |
| Mixed Kraft Env. & Bag Cuttings | 4.00 | / 4.25 |
| Kraft Envelope Cuttings | 3.75 | / 4.00 |
| No. 1 Heavy Books & Magazines | 1.75 | / — |
| New Manila Envelope Cuttings, one cut . | — | / — |
| New Manila Envelope Cutings | 4.00 | / 4.25 |
| White Tabulating Cards | 5.00 | / — |
| Groundwood Tabulating Cards | 1.50 | / 1.75 |
| White Blank News . | 2.25 | / 2.50 |
| No. 1 Assorted Old Kraft | 3.50 | / 4.00 |
| No. 1 Mixed Paper . | .60 | / .65 |
| Overissue News | .90 | / 1.00 |
| No. 1 News | .70 | / .75 |
| Box Board Cuttings . | .60 | / .70 |
| New Corrugated Cuttings, Kraft | 2.75 | / 3.00 |
| Old Kraft Corrugated Containers .. | 2.50 | / — |
| Old Corrugated Containers | 1.25 | / 1.30 |
| Jute Corrugated Cuttings | 1.07½ | / — |
| Paper Strings | 2.00 | / 2.25 |

### Bagging

(F. o. b. Boston)

| | | |
|---|---|---|
| Gunny Bagging— | | |
| Foreign | — | / 4.75 |
| Domestic | — | / 4.75 |
| Sisal Rope No. 1 .. | 6.00 | / — |
| Sisal Rope, No. 2 .. | 5.50 | / — |
| Mixed Rope | 5.25 | / — |
| Mixed Strings | 2.00 | / 2.50 |
| Transmision Rope— | | |
| Foreign | nominal | |
| Domestic | 3.00 | / 3.50 |
| Manila Rope— | | |
| Foreign | nominal | |
| Domestic | 6.25 | / — |
| Soft Jute Rope | 5.00 | / 5.25 |
| Jute Carpet Threads | 6.00 | / — |
| Bleachery Burlap | 8.50 | / 9.00 |
| Scrap Burlap— | | |
| Foreign | — | / 4.75 |
| Domestic | — | / 4.87½ |
| South America | 5.25 | / — |
| Wool Tares | | |
| Foreign | 4.75 | / — |
| Domestic | 4.75 | / — |
| Asst. Wool Pouches | 5.00 | / 5.25 |
| New Zealand Wool Pouches | 5.25 | / 5.50 |
| New Burlap Cuttings | 6.00 | / 6.50 |
| Heavy Baling Bagging | 5.25 | / 5.75 |
| Paper Mill Bagging | 3.50 | / 3.75 |
| No. 1 Roofing Bagging | 1.75 | / — |

### Domestic Rags (New)

(F. o. b. Boston)

| | | |
|---|---|---|
| Shirt Cuttings— | | |
| New Light Prints | .07½ | / — |
| Fancy Percales .. | .08 | / — |
| New White No. 1 . | .11 | / .11¼ |
| New Light Flannelettes | .08 | / .08½ |
| Canton Flannels, Bleached | .10 | / .11 |
| Underwear Cutters, Bleached | .11½ | / — |
| Underwear Cutters, Unbleached | .11 | / .12 |
| Silesias No. 1 | .08 | / .08½ |
| New Black Silesias . | .04½ | / — |
| Red Cotton Cuttings | .05 | / — |
| Blue Overalls | — | / .08½ |
| Soft Unbleached | .11 | / .12 |
| Blue Cheviots | .08½ | / .09 |
| Fancy | .06 | / — |
| Washable | .06 | / — |
| Khaki Cuttings | .06½ | / .07½ |
| Corduroy | .03½ | / — |
| Men's Corduroy | .04½ | / — |
| Ladies' Corduroy | .04 | / — |
| Khaki Canvas | — | / .06 |
| B. V. D. Cuttings .. | .11½ | / — |

### Domestic Rags (Old)

(F. o. b. Boston)

| | | |
|---|---|---|
| White No. 1— | | |
| Repacked | 3.80 | / — |
| Miscellaneous | 3.20 | / — |
| White No. 2— | | |
| Miscellaneous | 2.65 | / — |
| Twos and Blues, Repacked | 2.20 | / — |
| Old Blue Overalls .. | 2.25 | / 2.50 |
| Thirds and Blues, Repacked | 2.20 | / — |
| Miscellaneous | 1.80 | / — |
| Black Stockings | 3.50 | / 4.00 |
| Roofing Stock— | | |
| No. 1 | 1.85 | / — |
| No. 2 | 1.75 | / — |
| No. 3 | 1.65 | / — |
| No. 4 | 1.65 | / — |
| No. 5, Quality A. | 1.35 | / — |
| Quality B. | 1.20 | / — |
| Quality C. | .95 | / — |
| Old Manila Rope | 6.00 | / — |

### Foreign Rags

(F. o. b. Boston)

| | |
|---|---|
| Canvas | (nominal) |
| Dark Cottons | (nominal) |
| Dutch Blues | (nominal) |
| New Checks and Blues | (nominal) |
| Old Fustians | (nominal) |
| Old Linsey Garments | (nominal) |
| New Silesias | (nominal) |

## CHICAGO

### Waste Paper

(F. o. b. Chicago)
Mill Prices, Baled

| | | |
|---|---|---|
| Shavings— | | |
| No. 1 Hard White Envelope Cuts, one cut | $150.00/ | — |
| No. 1 Hard White Shavings, runruled | 140.00/ | — |
| No. 1 Soft White Shavings | 120.00/ | — |
| No. 1 White Ledger . | 85.00/ | — |
| No. 1 Heavy Books & Magazines | 35.00/ | — |
| White Blank News . | 80.00/ | 85.00 |
| Mixed Kraft Env. & Bag Cuttings | 90.00/ | 110.00 |
| No. 1 Assorted Old Kraft | 35.00/ | — |
| Overissue News | 24.00/ | — |
| No. 1 News | 21.00/ | — |
| No. 1 Mixed Paper . | 13.00/ | — |
| Old Corrugated | 26.00/ | — |
| Mill Wrappers | 17.00/ | — |

# MARKETS

BLANC FIXE—Market unchanged. Demand continues strong. Prices firm. Pulp is currently quoted at $85 in bags, car lots at works, 6 cents per lb., l.c.l., dcld.; by-product $75 per ton, car lots at works, 6 cents per lb., l.c.l., deld.

BLEACHING POWDER—Supply adequate. Delivery good. Prices range from $3.75 to $4 per 100 pound drums, l.c.l works.

CASEIN—Argentine market firmer with slight price rise. Domestic market continues inactive. Current prices on processed acid precipitated casein at 32 to 34 cents per pound for domestic grades and 28¾ to 30¾ cents for imported grades, f.o.b. shipping point.

CAUSTIC SODA—Production continues unequal to increasing demand, although new output may reduce problem this year. Solid caustic is reported at $2.85 per cwt.; flaked and ground is quoted at $3.25 per cwt. in 400 pound drums, $3.75 per cwt. in 100 pound drums—car lots at works; liquid 50 percent in tank cars at $2.25 per cwt.; liquid 73 percent in tank cars at $2.35 per cwt, at works.

CHINA CLAY—Domestic grades and imported in good supply. Filled is $9 to $11.50 per ton, car lots; coating clay is $14 to $22. Imported clay quotation, short tons, $16 to $35, export warehouse.

CHLORINE—Spot easing in tank-car stocks in some sections. Pacific supply good. Shortage of tank cars a delivery problem. Currently quoted at $2.25 per cwt. in single unit tank cars, at $2.55 to $3.75 per cwt, in multi-unit tank cars, f.o.b. works.

ROSIN—Buying dull. Supply low, Prices decline. Gum rosin in drums per 100 pounds net in yard. New York car lots. B, $8; D, E, F, G, H, I, K, M, N, $8.25; WG, $8.30; WW, $8.40; wood rosin, per 100 pounds, net, f.o.b., l.c.l., N. Y., B, $6.45; FF, $7.70; G, H, I, K, M, $8.78; N, $8.83; WG, $9.30; WW, $9.35; X, $9.45.

SALT CAKE—Demand continues ahead of supply with slight improvement in shipments. Prices unchanged. Domestic salt cake is quoted at $20 to $26.

SODA ASH—No easing of strong demand and tight supply. Deliveries behind schedule. Current prices, car lots, per 100 pounds; in bulk, $1.10; in paper bags, $1.30; and in barrels, $1.70.

SODIUM BICARBONATE—Strong demand with supply somewhat tighter. Reported as $1.85 per cwt, paper bags, carload lots.

STARCH—Demand easy. Supply plentiful. Pearl grade quoted at $6.96 per 100 pounds; powdered starch at $7.07 per 100 pounds; car lots, New York.

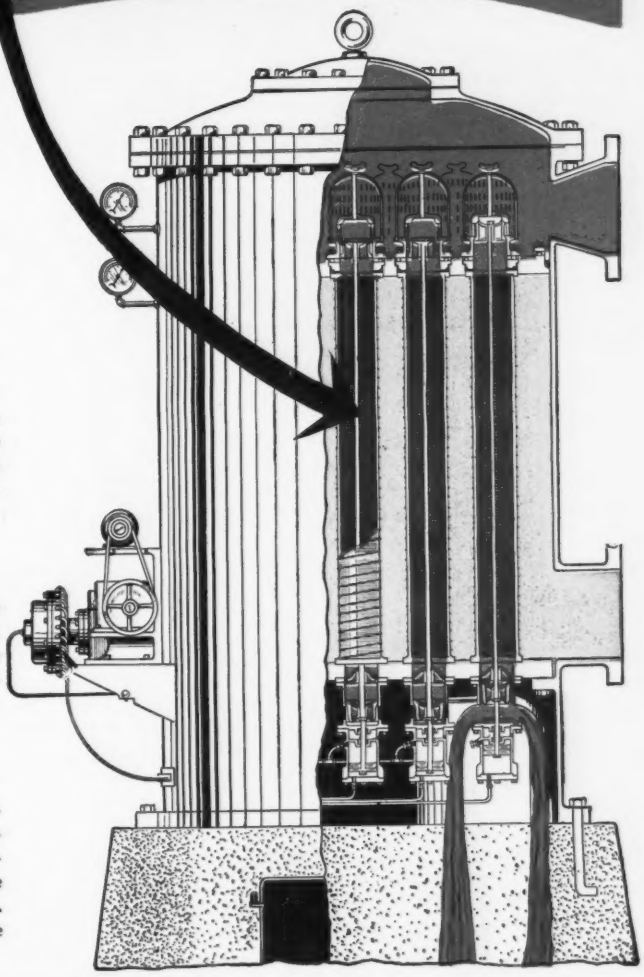
SULPHATE OF ALUMINA—Prices unchanged. Supply steady. The commercial grades are quoted at from $1.15 to $1.30 per 100 pounds, in bags, car lots, f.o.b. works. Iron free is $2 per 100 pounds in bags, car lots, at works.

SULPHUR—Supplies ample. Prices unchanged. Annual contracts are quoted at $16 to $18 per long ton, f.o.b. mines; the price f.o.b. at Gulf ports is $17.50 to $19.50 per long ton.

TALC—No change in domestic market. Demand far in excess of supply. Domestic grades are currently quoted at $21 per ton in mines; Canadian at $35 and up per ton. All prices in car lots.

TITANIUM DIOXIDE—Extremely tight supply. No early easing seen in situation. Shipments on allocation. Anastase 17½c lb. carload lots, 18-18½c l.c.l., rutile, 19½c lb. carload lots, 20-20½c l.c.l.; 50-lb. bags, f.o.b. plant, minimum freight allowance.

# ADAMS AUTOMATIC WATER FILTERS



## *Performance-Proved*

### BY THE PAPER INDUSTRY

### ✔ *for* PRIMARY FILTRATION

PORO-SCREEN Filters are a practical method for filtering water direct from the river or other source. Removes sand and grit 15 times finer than 1/32". Delivers a large volume of filtered water suitable for general mill service in the processing of newsprint, box board and other coarse grades of paper stock.

### ✔ *for* SECONDARY FILTRATION

PORO-STONE Filters provide effective filtration for water required in high grade paper stock. Installed following sand filter equipment, the PORO-STONE Filter eliminates finest sand, pipe scale and all foreign matter which might impair paper quality.

ADAMS Filters (both PORO-SCREEN and PORO-STONE) are designed for continuous, automatic operation. No moving clearances to pass foreign material—no shut-downs required by back-wash cleaning—very little attention needed. *Constant filtration assured at all times.* Built in several sizes to meet your requirements. Write for Bulletin 901.

## ★ R. P. ADAMS COMPANY, INC. ★

### 231 EAST PARK DRIVE, BUFFALO 17, N. Y.

**ADAMS** PORO-STONE AND PORO SCREEN **FILTERS**

## Strathmore Employes Vote for Union Shop

WEST SPRINGFIELD, Mass.—The employes of the Strathmore Paper Company, have voted overwhelmingly in favor of a union shop clause in their labor agreement at a recent National Labor Relations Board election held at the company's plants here and in Woronoco. There were 451 employes certified eligible to vote, and 393 votes were cast. Of this number, 381 voted yes, 10 voted no, and two ballots were voided.

The labor relations requirements are for 51 percent or more of the eligible vote for adoption, and the vote showed a majority of 84 percent.

The question on the ballot read: "Do you wish the union (Tekoa Local, 197, International Brotherhood of Papermakers, AFL) to enter into an agreement with your employer which requires membership in such union as a condition of continued employment?"

The special election was presided over by Kenneth C. Doonan, special representative of the Boston office of the NLRB.

Tekoa Local and the Strathmore Paper Co., have been in agreement over the maintenance of membership clause for a number of years, and it has been a part of the union agreement entered into annually, the union states, but it had never been formally adopted in compliance with the requirements of the Taft-Hartley Act.

The special election covered this requirement, and was a formality and not the result of any potential labor disagreement between the papermakers' local and the company.

For a number of years the union agreement provided that new employes must have attained membership in the local within 90 days of employment. In recent years, this period has been reduced to 30 days.


Save Money... CONVERT YOUR STARCH with RHOZYME

Rohm & Haas RHOZYMES—enzymes for the paper maker—have a long record of uniform, low-cost starch conversion for paper sizing, coating, and adhesives. Further economies are now possible with

**NEW, LOWER PRICED RHOZYME E-5**

This new five-times concentrate simplifies high solids, large batch conversions and is particularly adapted to preparing starches for machine coating. Is shipped in stable, dry form—easy to handle and store. Best of all, its cost is considerably lower than other starch-converting enzymes.

**RHOZYME BB FOR LOW SOLIDS CONVERSIONS**

RHOZYME BB, a single strength product, continues to be the standard enzyme for low solids conversions, such as tub size where enzyme concentrates are sometimes difficult to handle. Also in dry, stable form for unexcelled storage characteristics and lasting, uniform effectiveness.

**AVAILABLE NOW**

Both RHOZYME E-5 and RHOZYME BB are immediately available in quantities from drums to carloads. We'll gladly send you full information, plus samples for testing.

*RHOZYME is a trade-mark, Reg. U. S. Pat. Off.*

*Represented in South America by Cia. Rohm y Haas, S. R. L., Carlos Pellegrini 331, Buenos Aires, Argentina and agents in principal South American cities.*

ROHM & HAAS COMPANY

*WASHINGTON SQUARE, PHILADELPHIA 5, PA.*

Manufacturers of Chemicals including Plastics • Synthetic Insecticides • Fungicides • Enzymes • Detergents • Germicides • Chemicals for the Leather, Textile, Ceramic, Rubber, Paper, Petroleum and other Industries


## Gould Program Includes Employe Home Advice

LOWVILLE, N. Y.—Advising employes about home conditions that affect working output is one of the newest duties of a personnel department, Edward A. Jackman, personnel director of the Gould Paper Company of Lyons Falls, told the Kiwanis Club at a meeting here.

"Management's personal touch with its employes through the personnel department is coming to be recognized as one of business' most important gains," Mr. Jackman declared. He is also newly elected president of the board of directors of the Lewis County Chamber of Commerce.

Personnel has a special place in a large company because it is not concerned with actual manufacturing or mechanics, Mr. Jackman said.

"We have no direct responsibility for industrial operations. Instead our job is to produce ideas and opinions that will make for better employe-employer relations. We pass these ideas on to the executives who put them into action," he said.

## Moorhead Electrical Machinery Succeeds Moorhead-Reitmeyer

PITTSBURGH — The Moorhead-Reitmeyer Company Inc., has changed its name to the Moorhead Electrical Machinery Company. There is no change in ownership or personnel and the Moorhead Electrical Machinery company will continue in the business of buying and selling power equipment and mining equipment, with offices and warehouse at 30th & Brereton Streets, Pittsburgh, also warehouse at Oakdale. Wm. L. Moorhead established the business in 1919 and will continue as President of the Moorhead Electrical Machinery Company.

## Chase Starts New Machine

CHAGRIN FALLS, Ohio — The Chase Bag Company has put in operation a new paper making machine which represents an investment of over a million dollars. The machine has now been operating for the past two weeks turning out 40 tons of 115 inch paper every 24 hours.

# No other slime control system

## *offers you this combination of advantages . . .*

•The Nalco Feeder

***EFFECTIVE*** — The Nalco System, properly employed, will assure you of continuously successful slime control.

***STABLE*** — Nalco slimicides are stable in solution, do not become used up by pulp or other materials in the water. Thus, duration of effective action is lengthened and a smaller volume of chemical is required to do the job.

***BRIQUETTE FORM*** — No liquid, powder or gas to handle. Less waste. Safer—nothing to endanger employees.

***NON-CORROSIVE*** — Will not attack metals—does not harm your equipment.

***EASY TO CONTROL*** — Correct treatment requires no complicated system of control.

***INEXPENSIVE FEEDER*** — The simple, positive-action Nalco Feeder makes introduction of the chemical an easy job. Need for elaborate, expensive feeding equipment is eliminated.

***NO ALL-PURPOSE CHEMICAL*** — Different types of slime require different treatments. Nalco offers you treatments that best meet your conditions.

***ECONOMICAL*** — Nalco treatment is not expensive. Its effectiveness saves you far more than the treatment costs.

***COMPLETE*** — Laboratory research, field service, specially developed chemicals, feeding and test equipment, continuous check on results.

For a final answer to your slime control needs, consult Nalco.

• *Only with the Nalco System do you get this efficient, simple, positive method of feeding slimicides into your system. Nalco chemicals come to you in briquette form, clean and easy to handle. Dropped into the feeder, they are automatically introduced into the system with dosage control at your fingertips. No other equipment is required.*

**NATIONAL ALUMINATE CORPORATION**

**6221 West 66th Place, Chicago 38, Illinois**

***Canadian inquiries should be addressed to Alchem Limited, 555 Eastern Ave., Toronto 8, Ont.***

*—A* Complete *Scientific Paper Mill Water Treating Service . . . Slime Control . . . Water Softening and Clarification . . . Controlled Alumina Sizing Method . . . Boiler Feedwater Treatment.*

Nalco

## Gummed Industries Launches Program

*(Continued from page 12)*

to the member manufacturers, the two field men will make presentations to carriers, paper trade associations, and major post office departments throughout the country.

The program is of interest to everyone directly or indirectly connected with the packaging industry, not only because of its far-reaching effect on improved packaging methods, but also because it is an outstanding example of how a trade association analyzed an industry-wide problem, developed a workable solution, and actually put it into operation for the benefit of all concerned.

The Gummed Industries Association, with headquarters in New York City, represents 97 percent of the gummed paper industry, with a total of 30 out of 31 member manufacturers from coast to coast. The Association has long realized the seriousness of the problem of shipping damage, and has carried out a number of extensive field surveys, to determine how and why packages are most frequently damaged in shipment. Their fiendings revealed that damage was fairly equally divided among cartons using various closure methods, but that in the case of failures where gummed tape was used, the trouble was almost invariably due to improper application. As such improper application was apparently the result of carelessness or ignorance, the problem was essentially that of teaching shipping room personnel how to do a better job.

Last Fall, the Association met in Cleveland to discuss this problem and point a way to its solution. At that time an outline of the proposed educational program, built around the training film was presented. The plan was immediately approved, and an advertising committee was appointed to follow through on the details. This advertising committee, under the direction of Mr. Deitsch, was charged with the responsibility of supervising the preparation of all parts of the program, which, in addition to the slide film, includes a large constant-reminder wall chart, a pocket-size instruction manual, and direct mail and publication advertising to merchandise the program to shippers and paper merchants all over the country. The following members now serve on this committee: Russ Y. Cutler, The Tanglefoot Company; W. K. Gerbrick, Central Paper Company; Maurice London, Hudson Pulp & Paper Corporation; A. L. Zinke, Mid-States Gummed Paper Company.

All elements of the program have now been completed, and the initial presentations are already under way. This industry-wide campaign represents the culmination of seven years of study and planning by the Association, in an effort to help shippers do a better job.

The 15-minute sound slide film, the cornerstone of the whole program, gives detailed instructions on how to apply gummed sealing tape for most effective protection, how to use and care for tape dispensers, and how to store tape properly. The 2 by 3 foot wall chart, reproduced in four colors, displays the eight steps to perfect closure, together with instructions on use of dispensers and storage of tape. The 12-page pocket-size instruction manual summarizes the main points covered in the slide film, for handy reference. Wall charts and instruction manuals will be given out at each showing of the slide film.

Year after year the country's most efficient paper mills have depended upon Cincinnati Rubber Covered Rolls for outstanding operation.

Cincinnati's recognized advantages of holding the crown longer . . . uniform density . . . precision grinding and conformity to specifications are the reasons for this trust.

Depend upon Cincinnati for your next Roll Cover.

CINCINNATI RUBBER MANUFACTURING CO.
CINCINNATI 12, OHIO

CINCINNATI RUBBER COVERED ROLLS

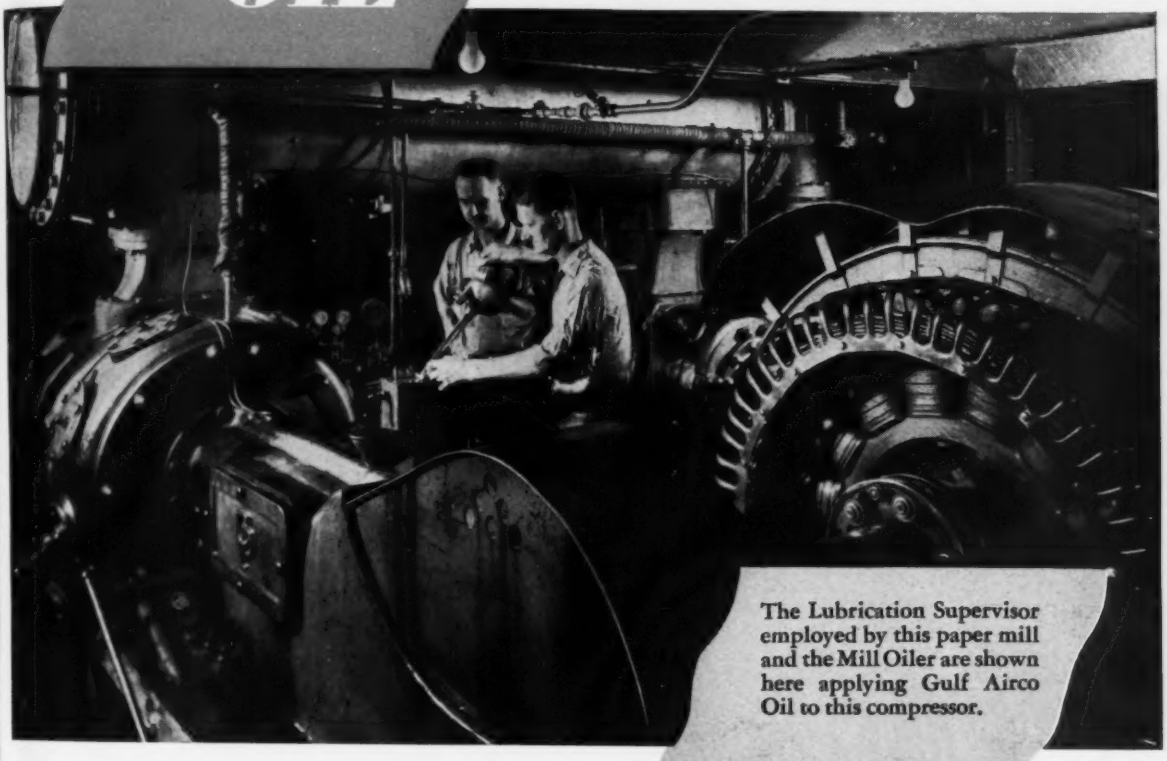
## New Canadian Alkali Plant Makes Rapid Progress

MONTREAL—Two buildings of a new chlorine and caustic soda plant being built for the Dominion Alkali & Chemical Company, a subsidiary of the Dominion Tar and Chemical Company, Ltd., at Beauharnois, Quebec, have been completed, according to the H. K. Ferguson Company, industrial engineers and builders.

Construction of the remaining seven structures, including a cell building 356 x 120 ft., is going ahead rapidly. A railroad spur, roadways and water system have already been finished.

"With GULF AIRCO OIL we eliminated excessive wear in compressor cylinders and rings"

says this Lubrication Supervisor



The Lubrication Supervisor employed by this paper mill and the Mill Oiler are shown here applying Gulf Airco Oil to this compressor.

"WE HAD TRIED SEVERAL BRANDS of lubricants, in an attempt to reduce scoring of cylinder walls and eliminate excessive wear of piston rings in our air compressors," says the Lubrication Supervisor of a large northern paper mill. "Then we called in a Gulf Lubrication Engineer and asked him to investigate our difficulties.

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# DIGESTED

Throughout the entire paper industry, excess demand has kept marginal production running longer than was anticipated would be physically possible, even omitting consideration of the uneconomical costs and inferior quality. Forecasts made by economists, concerned for the most part with only the paper industry, might be considered somewhat less optimistic than those of the over-all forecasters. For the paper industry, there seems to be nothing untoward disclosed by the industry picture which would not be promptly corrected by enforced shut-downs of marginal mills.

The over-all increase in paper mill capacity since December 1945 has been authoritatively reported as 1,500,000 tons. It is estimated that about 1,750,000 more tons of capacity will be available during 1948 and 1949. But during 1946 and 1947 actual production was stretched by 3,750,000 tons to meet the insistency of the demand in all lines. When production is forced so far beyond balanced operations, high costs and bottlenecks pose problems much like those of the marginal mills. These problems, for the most part, yield only to the correction of returning to balanced operation. Such has been the experience of the paper industry in the past under similar circumstances.—*From the annual report of the Gaylord Container Corporation.*

## Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

| Current Weeks—1948 | | Corresponding Weeks—1947 | |
|---|---|---|---|
| February 14 | 100.5 | February 15 | 104.5 |
| February 21 | 99.4 | February 22 | 105.9 |
| February 28 | 102.1 | March 1 | 108.5 |
| March 6 | 99.9 | March 8 | 104.5 |
| March 13 (Revised) | 100.9 | March 15 | 107.2 |
| March 20 | *103.1* | March 22 | 105.8 |

COMPARATIVE MONTHLY SUMMARIES

| 1947 | | | | | | 1948 | |
|---|---|---|---|---|---|---|---|
| Jan. | 102.1 | May | 106.2 | Oct. | 109.5 | | |
| Feb. | 105.9 | June | 106.0 | Nov. | 109.3 | Jan. | 100.9 |
| Mar. | 106.1 | July | 93.5 | Dec. | 101.5 | Feb. | *100.3* |
| Apr. | 105.1 | Aug. | 104.2 | | | | |
| | | Sept. | 102.0 | Year Avg. | 104.3 | | |

COMPARATIVE YEARLY SUMMARIES

| | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|---|---|---|
| Year to Date | 88.9 | 103.7 | 88.6 | 88.6 | 88.2 | 98.1 | 104.9 | *100.7* |
| Year Average | 97.4 | 90.4 | 87.8 | 88.1 | 89.4 | 101.1 | 104.3 | |

NOTE: *As of January 10 capacity base increased by 13.3%*

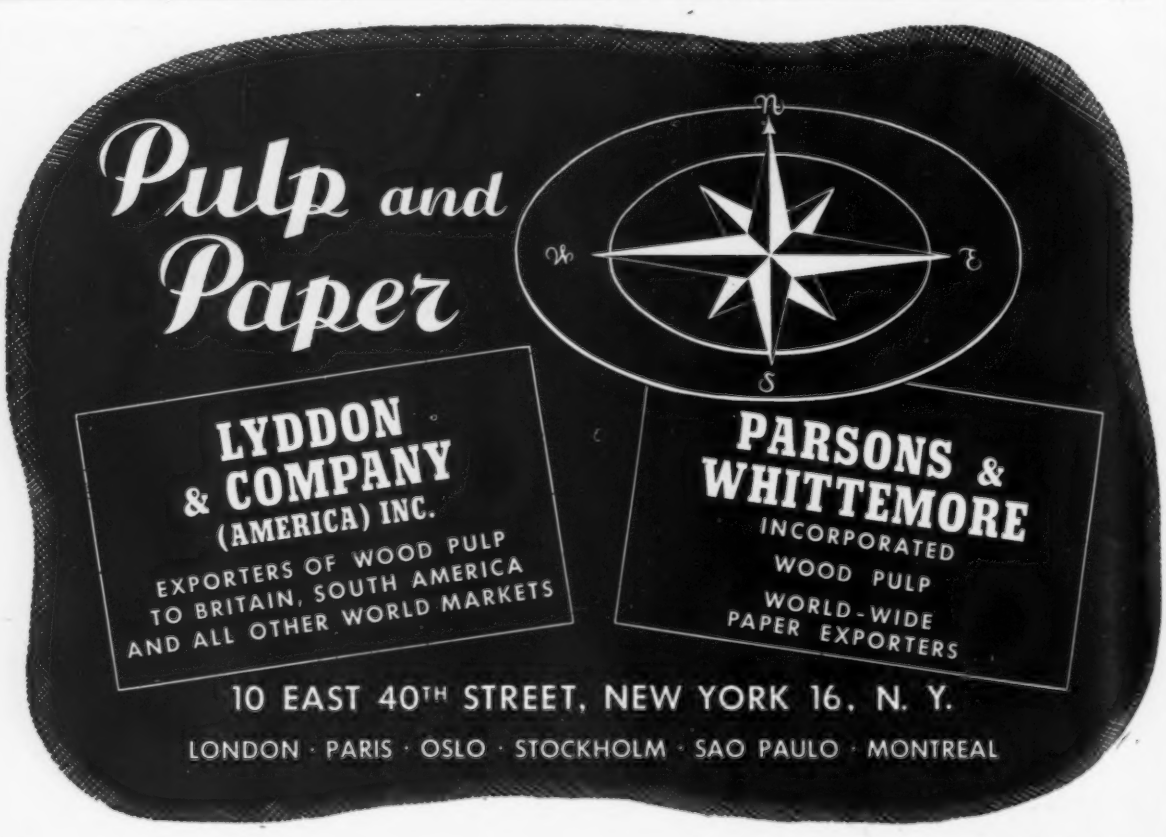
PAPERBOARD OPERATING RATIOS†

| Current Weeks—1948 | | Corresponding Weeks—1947 | |
|---|---|---|---|
| February 14 | 101 | February 15 | 102 |
| February 21 | 99 | February 22 | 103 |
| February 28 | 101 | March 1 | 102 |
| March 6 | 104 | March 8 | 102 |
| March 13 | 102 | March 15 | 104 |
| March 20 | *104* | March 22 | 103 |

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Year Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1947 | 99 | 103 | 101 | 100 | 101 | 101 | 90 | 99 | 96 | 101 | 99 | 89 | 98 |
| 1948 | 99 | *100* | | | | | | | | | | | |

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.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# EDITORIAL

## Mental Condition

From Canadian sources, usually well-informed, information comes through that hints are being dropped now and then that the tight paper supply situation may be in for a gentle amount of relaxing. To be sure, it is added, if the demands of the export trade for fine and kraft papers show any substantial increase the domestic market will continue under pressure so long as this demand holds up.

Few Canadian paper men it is said will venture to forecast very far into the future. They are inclined to hedge on the question of supply-demand for the balance of the year. Some are of the opinion demand will hold up and that increased production will have a tendency to bring about a more satisfactory balance between what customers want and what manufacturers are able to produce. However, there are those who believe that production will increase while demand will slacken, thus creating a fairly normal market condition, with a real selling job required for certain grades.

Market surveys in Canada have revealed the same soft spots here and there, corresponding to finding in the United States. This refers to papers other than newsprint. Respecting high-grade high rag-content papers, the supply is said to be good and meeting demand owing to a better rag supply and some increase in production facilities. It is also said that demand has slackened a little since last year. The supply-demand situation regarding other types of fine papers is spotty. There is some easing of demand compared with last year, but this applies only to some grades of paper. In some other grades mills are running three months behind orders while deliveries on still other grades are improving.

The kraft papers manufacturers are still unable to meet the full demand for their products. While inventories are said to be gradually building up, customers seeking No. 1 kraft may have to be satisfied with No. 2. Demand for No. 1 is substantialy the same as last year, and any improvement in the supply would be due to a corresponding improvement in production. Demand for No. 2 kraft may possibly be dropping off a little.

Generally speaking, Canadian paper men agree with the statement attributed to David L. Luke, Jr., president of West Virginia Pulp & Paper Company, to the effect that "a period of aggressive competition is not far off."

In the present case it might be deemed that the news of what people are thinking is of distinctly second interest to the record that they are thinking. Those who keep their ears close to the ground on this side of the international border have discovered similar instances where relaxing pressures by no means indicate that the use of paper is falling off. Usually those who think straight through to the source discover a completely healthy condition which may mean that supplies are catching up enough to reduce the amount of competition among buyers. When this drops to the vanishing point its disappearance will have a salutary effect; its loss will eliminate the boom aspects of a market that threatened to lose its sense of values. When that shall have come to pass we no longer will need to wonder how long the boom is going to last; we shall know instead, that emphasis again is to be placed on excellence of product, skill of management, and hard work.

## Safety Conscience

Among its other distinctions in the history of the industry, 1947 is credited with being the year that management began to become truly safety-conscious. In British Columbia where logging for pulp mills is a major industry, it is said that the larger companies are now shooting at a reduction of some twenty-five per cent in their accident rate during 1948 based on their experiences with organized safety programs during 1947.

While more accidents occurred in lumber industries in British Columbia last year than ever before, on a production basis these accidents actually showed a decline according to A. M. Whisker, Executive Administrative Office of the British Columbia department of labor. Mr. Whisker states that if a chart is made of the accident situation in industry, it will be clearly seen that sawmills in B. C. showed a satisfactory decrease of accidents in all cases where a safety program had been adopted. He pointed out that for the same production last year as compared to twenty years ago, more than twice as many logs had to be loaded, and transportation involved showed an increase in mileage of over 50 per cent.

Mr. Whisker points out that had no safety work been undertaken by the industry, the accident growth in proportion to these developments would have been deplorable. From close personal contact with the industry, Mr. Whisker states he is aware that management is not prepared to accept the continuance of even the present number of accidents. Mr. Whisker explains that the year 1947 showed the beginning of a broad interest in safety and of the implementing of a sound policy for accident reduction. He states that if during the current year steps are taken to consolidate the good work which has been done, the accident situation in the industry should be vastly improved and a reduction of 25 per cent might be anticipated for the year 1949. He suggested a goal of 1,000 less accidents during the current year would seem reasonable.

W. L. Cook

Editor

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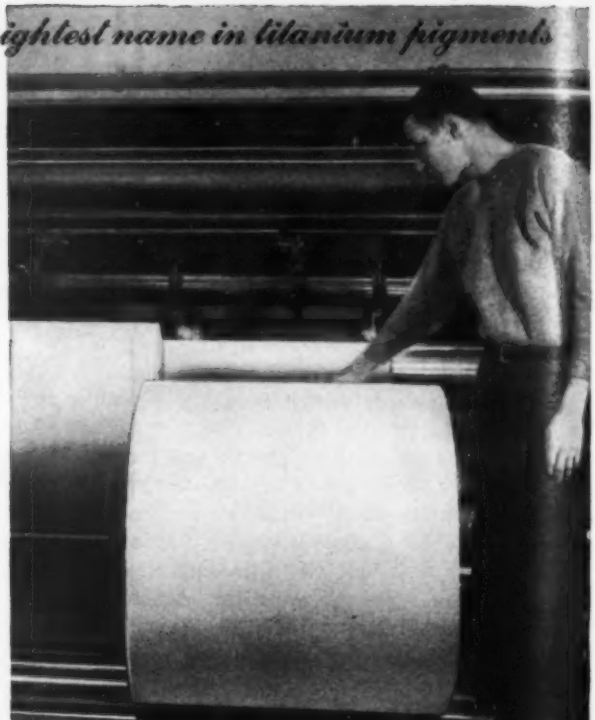

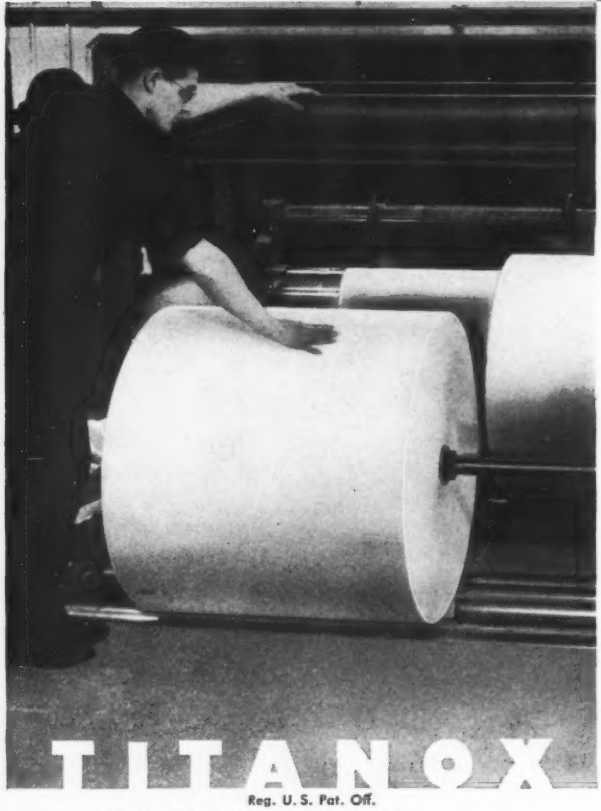


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# INDUSTRIAL DEVELOPMENT

# Clarification of Paper Boardmill White Water*

## I. Settling and Chemical Treatment

By Willem Rudolfs and Earl J. Axe
Chief and Research Associate, Rutgers University, New Brunswick, N. J.

For reasons of mill economy, for conservation of resources and the alleviation of pollution, increasing importance is given to the recovery of fiber and reclamation of water for reuse in the mills and its eventual discharge into receiving waters. The pollutional strength and character of waste white waters vary with the processing technique, recirculation ratio, raw materials, available recovery equipment and production schedule. The constituents of the wastes from the average mill exert an oxygen demand similar to medium or strong domestic sewage. Clarification of the white water reduces pollution, aids in recovery of fiber and may make the water more suitable for reuse. The degree of clarification is affected by the methods used. The purpose of this paper is to present experimental data obtained in an effort to evaluate some physical and chemical methods of treatment. For the evaluation two sets of data were used, those obtained by the treatment devices present in the mills, and those obtained experimentally in the laboratory.

### Wastes Used

Samples of white waters produced in unit processes together with influents and effluents, from recovery equipment in the mills, as well as total mill effluents were collected from a number of mills for classification and experimentation.

The amounts of suspended and oxygen demanding materials served as a basis for classification as follows:

| Classification | Suspended PPM | BOD PPM |
|---|---|---|
| Strong waste | 400 and over | 400 and over |
| Medium waste | 200-400 | 150-300 |
| Weak waste | 100-200 | 100-150 |

Since samples from individual mills fluctuate in relation suspended solids and BOD, some shifting of mills from one classification to another would occur. The chemicals used in experimentation were lime, alum, sodium silicate and various combinations.

* Paper of the Journal Series, New Jersey Agricultural Experiment Station, Department of Sanitation, Rutgers University.

### Clarification by Settling

Some studies of the settling characteristics of the suspended material were made with existing mill equipment. The detention periods, rates of flow, and capacities were estimated or obtained from data supplied by informed mill personnel. Typical average results obtained from newsprint and chip board mills concerning the removals of turbidity and BOD with equipment of varying design are shown in Table 1. The individual results showed considerable variations with the same settling time. The average removals of suspended material increased with the settling time; obviously 0.5 hour settling was insufficient, whereas more than 2 hours' settling did not materially improve the suspended solids removals. The 2 hours' settling results were obtained with an effective settling tank, whereas the 4 hour results were obtained with a tank of conventional design. The effective setling tank removed a higher percentage of BOD than the conventional tank.

Laboratory experiments to determine the turbidity and BOD removals by quiescent settling for 30 minutes with a number of samples from the same mills produced average results, as shown in Table 2. The degree of recirculation and high temperature (100-140°F) of the waste tend to increase the concentrations of materials producing turbidity and BOD and affect the degree of removal obtained by plain settling. The waste from Mill No. 8 with lower temperatures contained higher suspended solids, but lower turbidity than the waste from Mill No. 4. It appears, therefore, that the more finely divided material is more difficult to settle, and has a much higher BOD with lower removals.

Plain settling of separate wastes from specialty mills accomplishes removals of about 70 to 75% of the suspended materials.: The maximum removals were obtained in the cooking liquors at pH 11.0 to 11.5 and the least in the neutral bleach liquors. Table 3 gives the reductions of suspended material of the separate and those obtained by blending the cooking and bleach liquors in several proportions without pH adjustment after plain settling for 30 minutes and one hour.

### INDUSTRIAL DEVELOPMENT

**Paper Trade Journal, in this new section, proposes to make space available for discussion of administration and operational problems of the pulp and paper industry, as well as for the presentation of independent studies and research on technical and engineering subjects. Noteworthy features of paper mills, converting plants, associated industries and institutions also will be presented, as they become available. These pages will be open to all who are qualified to discuss subjects within these limits. Manuscripts, submitted for approval, will be welcomed.—E. P. McGINN, Industrial Editor.**

TABLE I.—REMOVAL OF TURBIDITY AND B.O.D. BY PLAIN SETTLING IN MILL EQUIPMENT

| Settling Time Hours | Turbidity | | | 5-Day B.O.D. | | |
|---|---|---|---|---|---|---|
| | Infl. ppm | Effl. ppm | Removal % | Infl. ppm | Effl. ppm | Removal % |
| 0.5 | 495 | 395 | 19.5 | 215 | 172 | 20.0 |
| 2.0 | 410 | 164 | 60.0 | 279 | 183 | 34.4 |
| 4.0 | 700 | 272 | 66.7 | 196 | 159 | 19.0 |

Results indicate that simple settling of the combined wastes for 30 minutes in the ratio of their production in the mill is about 50 percent less effective for the removal of suspended material than was obtained by settling them separately. The production ration of these wastes is about four of the cook wash to one of the bleach wash. It was considered of interest to determine some ratio other than the ratio of production which might prove more effective than separation and settling. When the two wastes were mixed in the proportion of two parts cook wash to three parts bleach wash, the removal of suspended material amounted to about 10 percent more than was obtained by separate settling for one hour, and about 50 percent more than by settling in the production ratio. Similar results were obtained by settling a mixture in the proportion of one part cook to four parts bleach.

## Clarification by Flocculation

Rudolfs and Gehm (1) have shown that, "slow stirring of settled sewage without coagulants produces a certain amount of coagulation." They also showed that stirring may remove 40 to 50 percent of the turbidity in about one hour. The remaining turbidity is "appreciable" and cannot be removed by flocculation even if stirring is continued 24 hours.

The removal of turbidity in paperboard mill wastes by flocculation was studied to determine possible reduction of chemical dosage.

The clarification studies of white waters by flocculation and coagulation were conducted in flocculation jars using mechanical stirring. One liter portions of the wastes were placed in the jars and after stirring, allowed to settle. The optimum speed of the stirrers was determined to be about 20 r.p.m. or a peripheral speed of 25 feet per minute. This speed was maintained throughout all the experiments involving flocculation and coagulation. Flocculation periods of 15 minutes were used throughout, followed by quiescent settling for 30 minutes. The volumetric application of solutions of the chemicals to the wastes for both reaction adjustment and coagulation, with or without the addition of supplemental coagulants, when used, was made with flash mixing for one minute.

After settling, the supernatant liquors were siphoned from the jars for the determinations of turbidity, pH and B.O.D. Sludges were transferred to graduated cylinders for measurement of volumes after 30 minutes' settling.

Slow stirring of some boardmill wastes generally effects a certain amount of coalescence, and the percentage of removal of turbidity obtained varies with the mill and in the same mill, depending upon the operation.

In other mill wastes, particularly those produced at higher than normal temperatures, the higher temperatures appear to cause dispersing of the particles. The effect of slime is to provide a protective film which serves to envelop the particles with a stabilizing material, or the presence of some unprecipitated alum may serve to peptise. As a result, stirring indues an excess of particles with similar charges. This causes dispersion of these particles, because the forces of repulsion are greater than those of attraction, and both the turbidity and the B.O.D. may be increased by the stirring. This may be observed in comparing the removals of turbidity by plain setling and by flocculation of the wastes from Mills Nos. 4 and 4a. (Tables 2 and 4). The removals obtained by flocculation and settling are given in Table 4. These removals are generally of about the same degree as those obtained by plain settling.

In general, the removal of turbidity in boardmill wastes by flocculation is erratic and difficult to evaluate.

The effect of flocculation and settling of whole and mixed cooking and bleach liquors at several pH values was investigated. The wastes were adjusted to pH 3.2, 5.0, 7.0, and 9.0, flocculated, and allowed to settle 30 minutes. The supernatants were then siphoned off. One portion of each supernatant was used for determination of remaining suspended solids, and the other portion was readjusted to pH 7.0 for determining the remaining B.O.D.

Table 5 shows some results on the reduction of suspended materials and B.O.D. obtained at several pH values of the whole and mixed cook and bleach liquors. The removal of both suspended materials and B.O.D. in nearly all cases increased 5 to 15% as the pH value diverged from neutrality. The removals were generally higher in the mixed wastes than in the whole wastes. The removal of B.O.D. from the whole wastes also followed the pattern of removal of suspended solids. In the mixed wastes, however, the removal of B.O.D. was increased about 10% at pH 7.0 above the removal obtained in the whole cook waste and about 5% more than in the whole bleach waste.

Minimum removals of both B.O.D. and suspended materials were obtained at pH 7.0 in both the whole and mixed wastes. The overall removals of suspended material varied from 75 to 95%, averaging 87%, with accompanying reductions in B.O.D., averaging about 30%, irrespective of the ratio of the mixtures or the pH adjustment. Color was also reduced by flocculation in both the separate and mixed wastes from about 550 p.p.m. to an average of 290 p.p.m., or about 50% irrespective of pH value.

## Clarification by Coagulation

For the removal of non-settling colloidal material, coagulation with chemicals is usually employed. The coagulants most commonly used are salts of aluminum and iron. When added to water these react with the natural or added alkalinity and produce basic oxides or hydroxides of these metals which appear as flocculant precipitates. These precipitates, when forming are finely divided and under proper conditions and with gentle agitation are agglomerated into heavy floc masses. Rudolfs and Gehm (1) in the chemical treatment of sewage find that the ion in active change is most effective, and therefore rapid mixing of the chemicals with the waste is of paramount importance for producing a proper floc with a minimum of chemicals.

Ferric salts and alum yield a trivalent position ion which is most effective in neutralizing the negatively charged hydrophilic colloids or suspensoids. Neutraliz-

TABLE II.—REMOVAL OF TURBIDITY AND B.O.D. BY QUIESCENT SETTLING FOR 30 MINUTES

| Mill No. | Suspended Solids ppm | Turbidity | | | B.O.D. | | | Sludge Value % |
|---|---|---|---|---|---|---|---|---|
| | | Initial ppm | Time ppm | Rem. % | Initial ppm | Time ppm | Rem. % | |
| 4a | 205 | 510 | 240 | 53.0 | 214 | 143 | 33.1 | 7.5 |
| 8 | 844 | 890 | 400 | 55.0 | 260 | 182 | 30.0 | 9.7 |
| 4 | 668 | 1447 | 950 | 35.2 | 784 | 715 | 9.0 | 9.0 |

TABLE III.—SOLIDS IN MIXTURES OF COOK AND BLEACH WASTES AND SUPERNATANTS AFTER PLAIN SETTLING

| Proportions Mixed | pH | Suspended Solids | | | | |
|---|---|---|---|---|---|---|
| | | Begin ppm | 30 Min. ppm | Red. % | 1 Hour ppm | Red. % |
| Cook C | 11.1 | 606 | 149 | 75 | 90 | 80 |
| Bleach B | 7.0 | 332 | 92 | 72 | 94 | 72 |
| 4C to 1B | 11.1 | 550 | 338 | 38 | 284 | 48 |
| 3C to 2B | 10.6 | 497 | 256 | 48 | 216 | 56 |
| 1C to 1B | 10.2 | 469 | 198 | 58 | 180 | 62 |
| 2C to 3B | 9.6 | 442 | 64 | 86 | 64 | 86 |
| 1C to 4B | 8.8 | 388 | 93 | 76 | 42 | 89 |

ing the charges causes them to adhere to the floc particle so that the finely divided material is adsorbed and absorbed on the floc and is mechanically carried down in the settling process.

Eldridge (2) gave six factors for the effective coagulation of industrial wastes: 1, selection of the proper coagulant or combination of coagulants; 2. application of the optimum quantity; 3. presence of a sufficient amount of natural or added alkalinity for reaction with the coagulant; 4. optimum pH; 5. rapid mixing of the chemical with the waste; 6. slow stirring for a period to develop maximum "floc" size to insure rapid settling.

Theriault and Clark (3) also showed that the zone of optimum pH in respect to the first appearance of alum floc widens as the concentrations of buffering salts in solution increase.

Miller (4) found that, for successful coagulation with alum, a certain minimum quantity of the aluminum ion must be added. An anion of strong coagulating power, such as the sulphate ion, must always be present and the hydrion concentration must be properly adjusted. The rate of alum floc formation increases with dosage and hydrogen-ion concentration. The zone of optimum pH for coagulation of alum in connection with the first formation of the floc widens as the concentration of negative ions, or organic and colloidal matter in solution, increases. Miller (5) also found that the effect of the different anions in determining the zone of optimum pH was not limited to the aluminum precipitate, but experiments show that these principles apply also to the precipitates formed from ferric chloride and ferric sulphate.

Experiments were made to determine the removals of suspended materials, which impart turbidity to the wastes, by coagulating with the more commonly used chemicals. Alum is the papermakers' coagulant and is particularly favored by them because the aluminum hydrate is invisible in the sheet and exerts a sizing effect on the fibers. The alum applied to the beaters serves to sheath each fiber with a gelatinous coating, to effect the proper sizing, according to Sutermeister and Cobb (6). The quantities of alum used in the beaters in paperboard manufacture vary from 10 to 30 pounds per thousand pounds of stock, according to the judgment of the beater operator.

The hydrolysis of the alum produces some acidity in the water, so that the natural alkalinity of the water is reduced. The further additions of fresh or treated reclaimed water to the stocks in the jordans or in the machine chests, or from the discharge of shower water to the machine pits, serve to reduce the acidity in the wastes from the paper machine.

The value of recirculated waters to the beaters is said to be enhanced both by their higher H-ion concentration and the heat reclaimed, and usually less alum is required for succeeding beater charges.

It is not known whether the alum added to the pulp in the beaters is unprecipitated or whether dispersed floc also appear in the waste white water, which under suitable conditions may be precipitated later to affect coagulation of these wastes.

TABLE IV.—AVERAGE REMOVALS OF TURBIDITY AND B.O.D. BY FLOCCULATION AND SETTLING

| Mill No. | Turbidity | | B.O.D. | |
|---|---|---|---|---|
| | Before ppm | Removed % | Before ppm | Removed % |
| 4a | 630 | 60.8 | 233 | 32.4 |
| 8 | 1207 | 52.4 | 214 | 13.5 |
| 4 | 1371 | 30.5 | 873 | 15.0 |

Note: Some individual samples produced poorer results than by settling alone.

*1. Removal of Turbidity with pH Adjustment*

An attempt was made to suitable conditions for precipitation of alum in solution in the wastes was tried by making additions of alkali or acid to cover a range of pH values for determining the removal of turbidity by pH adjustment.

Typical neutralization curves of boardmill white water are shown in Figure 1.

The removal of turbidity at pH values 4.0 to 10.0 varies somewhat for the wastes from the individual mills. The average removals of turbidity effected at these pH values from pH 4.0 to 10.0 are given in Table 6 for four wastes. In general, the addition of acid effects only a relatively small removal of turbidity. The maximum removal is obtained on the alkaline side. The optimum pH for the maximum removal varies with the wastes. The trend of removals of turbidity effected by pH adjustment is allustrated by the average figures. Some variation in the character of wastes from different mills is again illustrated in the effects of pH adjustment on the removal of turbidity. At pH 7.0 the removal of turbidity was in effect about that obtained by flocculation and settling of the weaker to medium waste waters.

*2. Clarification with Alum*

Wastes used for coagulation studies were first passed through 100-mesh screens to remove settleable particles or those retained by effective recovery equipment in the mills.

In each coagulation the supplemental chemical was added with flash mixing for one minute, followed by addition of the coagulant with additional mixing. After

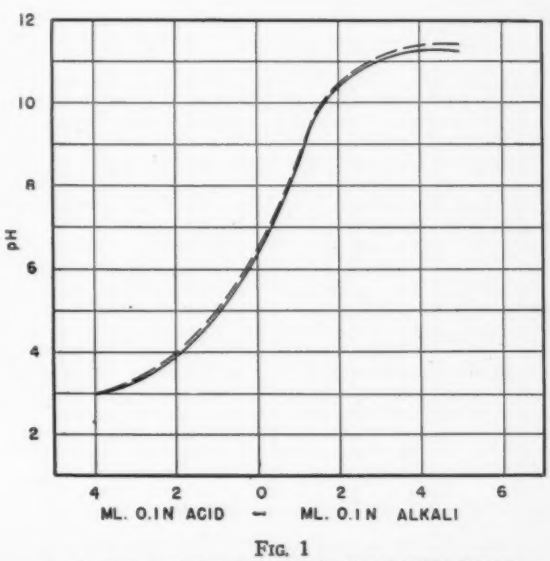


FIG. 1
Typical Neutralization Curves of Board Mill White Waters.

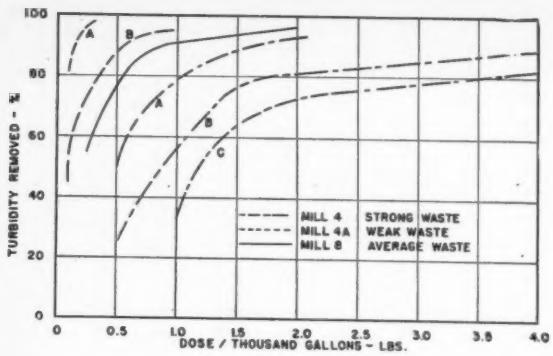


FIG. 2

**Trend of Removal of Turbidity from Boardmill White Water with Alum.**

mixing, flocculation by mechanical stirring for 15 minutes at 20 r.p.m. was considered adequate, and quiescent settling for 30 minutes ensued.

Fifteen coagulation studies using alum as the coagulant were made on the wastes from three mills. In eight, alum only was used as the coagulant; in four, using alum plus lime; and in three, using alum plus activated silica. Preliminary tests were made to determine the range of coagulant dose required for clarification produced. Coagulant doses required varied with the individual samples, and the ranges of dosage varied with the mills.

The dosage generally required to produce a floc of clarifying character varied between two and ten pounds per 1000 gallons for particular samples of the wastes. The average alum dose of 2.7 pounds per 1000 gallons produced removals of about 91 percent of the turbidity and about 30 percent of the B.O.D. Average remaining turbidity was about 123 p.p.m.; the remaining B.O.D. was about 360 p.p.m. Removal of B.O.D. by coagulation with alum varied from 6 to 50 percent for particular samples.

Figure 2 graphically shows the trends of removal of turbidity to boardmill waste white water with alum (Mill No. 7 is not shown because curve falls on curve for Mill No. 8). Coagulant (alum) demand and optimum dosage are also shown to vary with the wastes from each mill and in the white waters from the same mill at different times.

### *3. Clarification with Alum and Lime*

Coagulation of white water with alum may result in incomplete clarification with increasing doses of alum because the natural alkalinity for the reaction is exhausted and the pH reduced below the optimum by the quantities of coagulant required for the clarification desired. The optimum pH value for clarification of most samples ranged from 5.0 to 6.0. Since the coagulant demand varied from 2 to 5 pounds per thousand gallons and the amount of alkalinity necessary for reaction with the alum is about half of the alum dose, or from 1 to 2.5 pounds per thousand gallons for the dose required for cvlarification of this waste, it is obvious that

TABLE V.—EFFECT OF pH ADJUSTMENT ON REDUCTION OF SUSPENDED SOLIDS AND B.O.D. IN FLOCCULATED AND SETTLED WHOLE AND MIXED COOK AND BLEACH WASTES

| | | Whole Cook | | Whole Bleach | | 4C : 1B | | 3C : 2B | |
|---|---|---|---|---|---|---|---|---|---|
| | | Susp. Sol. | B.O.D. | Susp. Sol. | B.O.D. | Susp. Sol. | B.O.D. | Susp. Sol. | B.O.D. |
| Initial, ppm | | 508 | 620 | 536 | 540 | 514 | 560 | 519 | 560 |
| Removal, % at pH | 9.0 | 88 | 31 | 74 | 40 | 93 | 27 | 90 | 33 |
| | 7.0 | 85 | 21 | 69 | 26 | 89 | 32 | 87 | 32 |
| | 5.0 | 92 | 32 | 73 | 39 | 92 | 30 | 92 | 34 |
| | 3.2 | 96 | 35 | 78 | 45 | 95 | 38 | 95 | 37 |

natural alkalinities of 100 to 150 p.p.m. in the wastes are inadequate for reaction with more than 1.0 to 1.5 pounds per thousand gallons of alum. Hence, for more complete clarification, it was necessary to supplement the natural alkalinity with lime. The additions of lime to the wastes were made prior to the addition of the alum, and flash mixed.

The clarification of the waste waters using alum and lime to supplement the alum dose varied also with the mill and in individual samples of waste from the same mill.

An average alum dose of 3.8 pounds supplemented with about 1 pound of lime per 1000 gallons effected average removals of 95% of the turbidity and 25% of the B.O.D. But certain wastes treated with 1.0 lb. of alum per 1000 gal. and 0.5 lb. of lime, produced 92% clarification and removed about 40% of the B.O.D.

The remaining turbidity and B.O.D. in the clarified wastes averaged 76 p.p.m. and 500 p.p.m., respectively.

### *4. Clarification with Alum and Activated Silica*

Activated silica as an aid to coagulation has been applied to water by Baylis and others, and in sewage treatment by Swope, with some success for the production of large, tough, rapidly settling flocs and some savings in the amounts of chemicals required for clarification.

Experiments using activated silica were made to determine the applicability of the treatment to boardmill wastes for possible economy of chemicals and settling tank capacity.

The removals of turbidity obtained in average, and under some conditions in strong boardmill wastes, indicate possible savings in both the amount of coagulant required and in settling tank capacities for the clarification of these wastes.

In average wastes which had required 2 lbs of alum per 1000 gal. to effect a removal of 96% of turbidity, nearly equal (92%) clarification was obtained with less than 0.1 lb. per 1000 gal. and 0.03 lb. of silica. Strong waste which required 9 lbs. of alum to produce 80%

TABLE VI.—REMOVAL OF TURBIDITY AFTER ADJUSTMENT OF pH WITH ACID AND ALKALI

| Mill | | 4 | 4a | 7 | 8 | Average |
|---|---|---|---|---|---|---|
| Initial, ppm | | 1200 | 750 | 525 | 1300 | 945 |
| Removal, % at pH | 4 | 23 | 60 | 55 | 62 | 50 |
| | 5 | 42 | 58 | 62 | 60 | 55 |
| | 6 | 44 | 55 | 60 | 58 | 54 |
| | 7 | 40 | 49 | 52 | 55 | 49 |
| | 8 | 70 | 65 | 99 | 92 | 81 |
| | 9 | 80 | 72 | 99 | 95 | 87 |
| | 10 | 86 | 76 | 98 | 96 | 88 |

clarification, 3 lbs. of alum with 1.2 lbs. of silica per 1000 gal. effected 97% clarification. The removal of B.O.D. was greater with alum and silica than with alum alone from average wastes. Removal of B.O.D. from the stronger wastes was 35 to 50% less with alum and silica than with alum only. Effective clarifying flocs produced by alum and activated silica are large and settle quiescently about one-third to one-half faster than those produced by alum alone.

In view of the results obtained with both average and strong wastes in which 92 to 97% clarification was effected with alum supplemented with silica, required when alum only was used, the comparative costs of treatment are interesting, particularly for mills discharging volumes of wastes of 0.3 to 3.5 m.g.d.

Comparative Costs of Treatment per 1,000,000 gals of strong wastes: alum=$180.00; alum plus silica=$152.50; for average waste alum $40.00, alum silica=$4.15.

The saving in cost of chemicals resulting from the alum-activated silica treatment of boardmill wastes may

TABLE VII.—CLARIFICATION OF WHITE WATER WITH LIME IN OPTIMUM DOSES

| Mill No. | Dose per 1000 gal. | pH | | Turbidity | | B.O.D. | |
|---|---|---|---|---|---|---|---|
| | | Before | After | Initial ppm | Rem. % | Initial ppm | Rem. % |
| 7 | 0.2 | 7.0 | 7.3 | 525 | 98 | 200 | 43 |
| 8 | 0.4 | 7.0 | 7.7 | 1240 | 95 | 330 | 51 |
| 4a | 0.3 | 6.6 | 10.0 | 750 | 96 | 170 | 23 |
| 4 | 2.0 | 6.6 | 10.4 | 1460 | 90 | 700 | 14 |
| Ave. | 0.73 | | | | 95 | | 33 |

range from $8.00 to $125.00 a day for the volumes produced.

*5. Clarification with Lime*

It is well recognized that when lime is added to sewage a certain amount of coagulation takes place and, on settling, clarification is effected, which is in direct relation to the quantity of lime added. However, quantities of lime which produce causticity may disperse suspended material to sewage and produce an effluent of higher B.O.D. than existed before treatment.

The clarification of paperboard mill wastes with lime in economical doses was investigated for comparison with other coagulants, because lime is not favored in mill operation as it tends to increase the amount of alum required in beater charges. The removals of turbidity and B.O.D. in four boardmill wastes are given in Table 7.

Coagulation of average and strong boardmill wastes is also produced with additions of $Ca(OH)_2$. Additions of economical doses of 0.2 to 0.4 lbs. of lime to average mill waters effected about 95 percent clarification, and removals of B.O.D. Varying from about 23 to 50 percent. The increases in pH in the weaker waste waters necessary top roduce clarification were slight, from 7.0 to 7.7. In the stronger waste waters 2 lbs. of lime per 1000 gals. produced 90% clarification and a removal of 14% of the B.O.D. at a pH of 10.0.

There is no evidence in the results to indicate that the removal of B.O.D. in strong wastes was limited or hindered by the quantities of lime required for removal of the turbidity, because the remaining B.O.D. of the lime treated supernatants was not materially different from that of the alum treated supernatants, probably because of the paucity of suspended material which is dispersed at the alkaline pH values obtained.

The color of the wastes changed at about pH 9.0 and the supernatants appeared yellow. The yellow color was intensified with increasing pH values.

*6. Clarification with Ferric Chloride*

To determine the effectiveness of economical doses of ferric chloride in boardmil wastes for comparison with the effectiveness of alum, supplemented or alone, experiments were made for the removal of turbidity and B.O.D. with this coagulant.

In the coagulation of sewage with ferric chloride two optimum pH values occur, in the high pH 10.0 and low pH 3.0 values. In the interest of mill treatment economy only the low values produced by the coagulant itself were investigated.

The clarification obtained with ferric chloride shows about 90 to 95% removal of weak to average boardmill white waters in doses of 0.2 to 1.0 lb. per 1000 gals. with removals of B.O.D. of 25 to 50%. In strong white waters 5.0 lbs. per 1000 gals. achieved about 82% clarification and 13% removal of B.O.D. Remaining turbidities in weak or average white water were about 70 p.p.m. and in the stronger waste about 214 p.p.m. The B.O.D. remaining varied from 128 to 575 p.p.m.

*7. Clarification with Ferric Sulphate*

The effectiveness of ferric sulphate for removal of turbidity and B.O.D. was investigated in boardmill white waters of average strength for comparison of the clarification produced in these wastes with the clarification produced with alum, lime, and ferric chloride in the same wastes.

The removals of turbidity in these waters were about 93%, with corresponding removals of B.O.D. of 22 to 44% or about the same as obtained with similar doses of the other coagulants. The remaining turbidities and B.O.D. in the supernatants were also similar.

*8. Comparison of Removal of Turbidity and B.O.D. by Chemical Coagulation*

The wide variations in both chemical demand and degree of clarification effected by the chemical treatment of boardmill white waters, either from the same mill or in different mills, make difficult a formulation for the effective dosage of any one coagulant, the coagulant demand of a particular waste white water, or the relation between the removal of turbidity and the removal of B.O.D. Figure 3 shows the trends of removals of turbidity and B.O.D. in strong and average boardmill wastes by chemical coagulation irrespective of chemical.

*9. Sludges Obtained by Clarification*

Since the suspended materials in the white waters varied widely with the effectiveness of recovery equipment in the mills, screening of the white waters to remove the large particles, particularly the fiber, was resorted to for establishing a basis for estimating the relative volumes of sludges produced by clarification. The volumes of sludges obtained by plain settling, by flocculation, and by coagulation varied also with the mill, in the same mill, and with the treatment of the wastes, especially with chemical treatment.

The volumes of sludges obtained by settling varied from 6.2 to 9%, averaging 7.7%. Flocculation increased the volume of sludge; however, in several mills the average volumes of sludges were decreased by flocculation. Variations from 6.8 to 8.7%, averaging 7.8% sludge volumes, were obtained.

The volumes of sludges produced by chemical treatment varied also in each mill and from mill to mill, as well as with the coagulant. The volumes of sludges from alum treated waters varied from 7.5 to nearly 10%, averaging about 8.7%. The average alum sludge

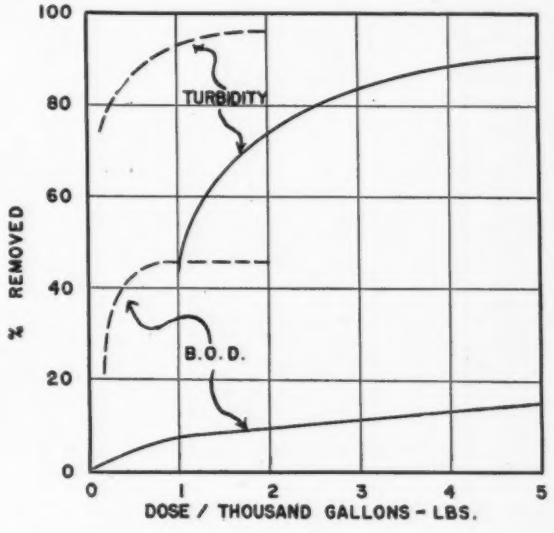


FIG. 3
Trends of Removal of Turbidity and B.O.D. by Chemical Coagulation, Irrespective of Type of Chemical.

volume was about 17% less than the average alum and lime produced sludges, and from 6 to 15% less than sludges produced by other coagulants.

Alum and lime treated waters produced sludges in volumes varying from 7.0 to 14%, averaging about 10%. Lime treated waters produced sludges varying from 7.6 to 10.5%, averaging 9.3%. The volumes of sludges from waters treated with ferric chlorides varied only from 10 to 10.1%, whereas waters treated with ferric sulphate produced sludge volumes varying from 8.3 to 12% and averaged about 10.3%.

The mills producing the weaker wastes generally produced the least sludges, regardless of clarification treatment.

## Discussion

The effectiveness of plain settling for the removal of turbidity and B.O.D. varies widely. The materials producing most of the turbidity and B.O.D. are in a finely divided state, or are in solution and do not settle readily, hence, this treatment is generaly relatively ineffective for clarification of these wastes.

Clarification by mechanical stirring or flocculation is extremely variable. Stirring may be beneficial or detrimental, depending upon the nature of the materials in suspension.

The chemical coagulants studied in connection with clarification of white waters were found to be about equally effective for removal of turbidity when adequate quantities were added with proper pH adjustment. It appears that most of the coagulant demand is exerted by the negatively charged soluble material, colloidal sols and emulsoids present, particularly in the stronger wastes. The doses of coagulants required for "breaking" the solution links or destroying the protective films for the "salting out" of these systems vary with the strength of the wastes or with the natures of the systems present. In average wastes relatively small quantities of any of the coagulants were required for this effect. In the stronger wastes the quantities necessary approach economically prohibitive doses.

Alum supplemented with activated silica appears to offer some considerable reductions in chemical dosage required for the treatment of white water. The estimated saving in cost of chemicals may be sufficiently attractive to warrant either pilot plant study or full scale installations where adequate control of the treatment process may be coordinated with the mill processes under circumstances which permit the correlation of the results to the variations in flow and the character of the waters.

Chemical treatment with settling for 30 minutes is generally effective for the removal of 90 to 95% of the turbidity in these wastes. Because most of the B.O.D. is exerted by the material in solution, this treatment is effective in removing an average of only about 25% of the B.O.D. On the average, complete clarification removes about 15% more, or about 40% of the B.O.D., and therefore does not solve the pollution problem for the final disposal of the average or stronger wastes.

Sludges produced by settling, flocculation, and chemical treatment vary from 8,000 to 20,000 cu. ft. for settled and flocculated sludge, and about 13,000 cu. ft. per million gal. for chemically treated sludges. The volume of sludge from one million gal. of average waste per day accumulates at the rate of about 12 cu. ft. per minute, and unless returned continuously to the mill system requires considerable storage capacity. Furthermore, stored sludge tends to deteriorate rapidly, thus increasing the possibility of machine difficulties when returned to the system.

## Summary

Methods of clarification existing in paperboard mills were studied and laboratory experiments made to determine the effectiveness of procedures. It was found that mill recovery equipment of the vacuum filter type, as well as conventional settling tanks, is, on the average, about 50% effective for the removal of suspended materials. The reduction of B.O.D. averages less than 25% in mill recovery equipment or in the laboratory. Plain settling of the wastes, either in the mill or in the laboratory, effects reductions of about half of the turbidity. Two hours' settling in effective tanks produces as good results as four hours' settling in conventional types of tanks.

It is extremely doubtful that mechanical flocculation is of value for the clarification of these wastes.

In practice and experimentally, about 90% of the suspended material and turbidity is removed by chemical coagulation and settling, regardless of the coagulant employed. The removal of B.O.D. by chemical coagulation and settling is, on the average, little more effective than plain settling.

Complete clarification of the wastes by coagulation and filtration through paper is about 40% effective in removing the B.O.D.

Chemical doses required for coagulation vary with the wastes and the nature of the soluble and semi-soluble constituents, and with the coagulant employed.

Alum supplemented with activated silica was found to be from 3 to 20 times more effective than alum only, for similar removals of turbidity, but the activation of the silica requires rather careful control for maximum effectiveness. When used in similar doses, alum, ferric chloride, ferric sulphate, and alum supplemented with lime effect about the same degree of removal of turbidity.

Volumes of sludges produced by plain settling, flocculation and settling, are generaly from 1 to 2 percent less than those obtained by chemical coagulation and vary somewhat with the waste. The volume of sludge produced by clarifying one million gallons of average boardmill waste amounts to about 13,000 cu. ft. after 0.5 hour settling.

Separate treatment by settling of cooking and bleach liquors produces better results than setling of combined wastes in various proportions. Flocculation and settling of cooking and bleach liquors showed that removal of suspended matter and B.O.D. increased as the pH value diverged from neutrality.

## Acknowledgement

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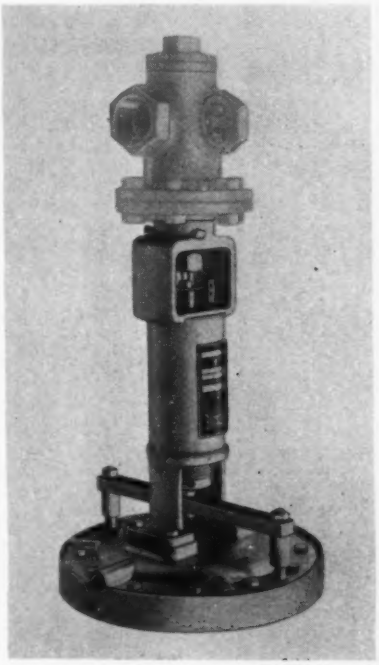
# EQUIPMENT AND SUPPLY

## New Leslie Superstructure Reverses Valve Action

LYNDHURST, N. J.—A new reversing superstructure for use on its Diaphragm Regulating Valves, has just been introduced by Leslie Co., 161 Delafield Avenue, Lyndhurst, New Jersey, a new development which permits reversing of the valve action by simple substitution for the standard superstructure. There is no need to remove the valve body from the line. The many man hours ordinarily required to remove a diaphragm regulating valve from the pipe line, remove the old gaskets, scrape the faces of the flanges and invert the valve body can thus be saved.

In designing the reversing superstructure, the maker states it was felt important to duplicate the performance of the standard superstructure in every way. Therefore, the same characteristic valve action is maintained when changing from one superstructure to another, including minimum hysteresis, the same effective diaphragm area and spring characteristic as the standard. The protective diaphragm cover is designed to provide safety and prevent tampering.

The reversing superstructure is of rugged construction, designed to permit relatively high pressure drops with good throttling control. Made of best available materials, it provides reliable performance with minimum maintenance. All metal parts, except the base, are bright finished. Base is 12 inches in diameter, rust-proofed underneath, and enameled a bright red on top for better visibility. The weight of the base is given as 7½ pounds and the total weight of the entire unit is stated as 10½ pounds.



New *Leslie* Reversing Superstructure for Diaphragm Regulating Valves

## Wet Film Thickness Gage Available In Four Ranges

BETHESDA, Md.—The Interchemical Direct Reading Wet Film Thickness Gage, recently introduced for measuring film thicknesses of paint, varnish, lacquers and related products of 0-4 mils, is now in production on three other ranges, 0 to 2 mils, 2 to 12 mils and 10 to 30 mils, according to the manufacturer, Henry A. Gardner Laboratory, 4723 Elm Street, Bethesda, Md.

Results obtained by the use of this new gage are said to be rapid and accurate and to embody all the desired characteristics heretofore unavailable in other gages. Of high-chrome content stainless steel throughout, the thickness gate is extremely rugged and the acme of simplicity. Accuracy or life of the instrument cannot be adversely affected by repeated immersion in thinners normally employed for cleaning purposes. Cost of the unit is nominal.

Illustrated circular available from manufacturer.

## Lincoln's New Movie Analyses Stresses

CLEVELAND—To assist the designer and engineer to use arc welded steel in the design of all types of machinery in many hundreds of different industries, The Lincoln Electric Company has recently released a new movie, "Designing Machinery for Arc Welding."

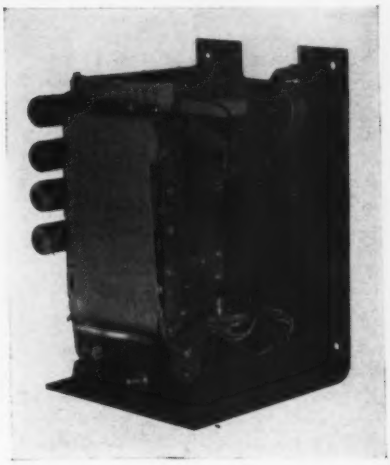
Based on the experience machinery manufacturers have had in using welded steel fabrication to improve performance and quality while reducing costs, this 16mm sound color movie gives examples of the four fundamental elements of all machinery: bases, wheels, containers and covers. In colorful and vivid animation, it compares various materials and presents a study of load factors, stresses, rigidity, performance and appearance. It explains how welded design permits freedom of planning, speeds up fabrication, reduces weight and permits greater strength from less material.

The film presents functional approach to design. Its theme is to use "the right material" of only the "right amount" in only the "right places." In other words, to design to meet service requirements exactly at minimum cost.

The new movie, which has a running time of approximately fifteen minutes, is available from The Lincoln Electric Company, Cleveland, Ohio, at no charge (except transportation) by all interested industrial organizations, technical societies, schools, colleges, etc.

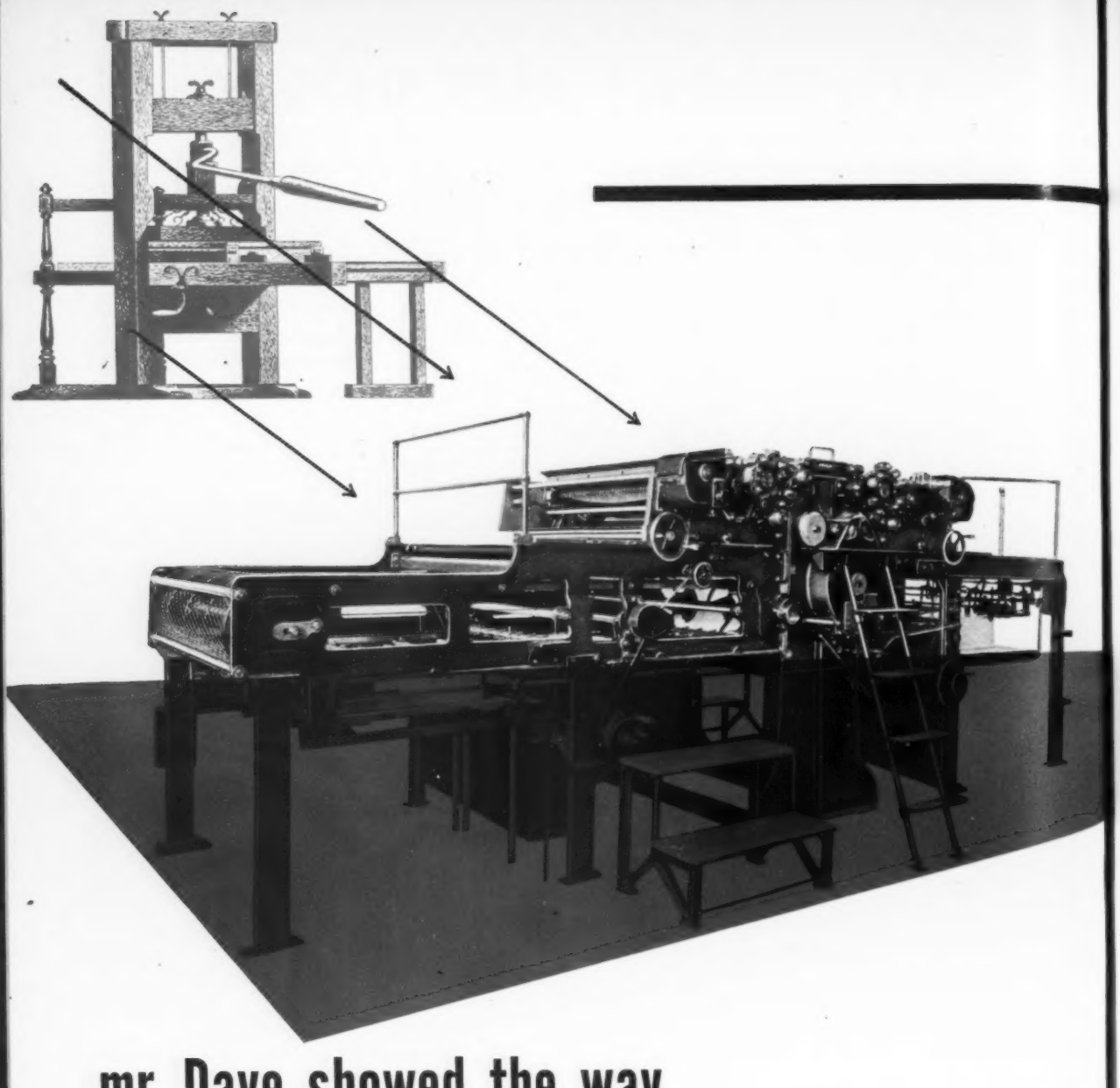
## Photoelectric Recording Wattmeter Introduced by GE

SCHENECTADY—A new photoelectric recording wattmeter designed for such applications as analyzing welding circuits and measuring industrial heating load, motor-starting load, and power surge has been introduced by the Meter and Instrument Divisions of the General Electric Company, Schenectady, N. Y. Consisting of a high-speed photoelectric recorder and a newly designed wattmeter measuring unit, the new instrument can be used to measure d-c power or a-c power up to 10,000 cycles per second.



The wattmeter, which has a linear scale, is available for portable use or for semiflush mounting. Chart speeds of a half inch per hour up to 72 inches per minute can be obtained by using different combinations of chart carriages and rate gears. When the instrument is calibrated for a particular frequency, accuracy is plus or minus 3 percent. When calibrated for 60 cycles, it can be used over the entire range of from 60 to 10,000 cycles at unity power factor with an error of plus or minus 5 percent. The power-factor error when going from 0.5 lagging to 0.5 leading is only plus or minus 3 percent.

The current circuit is rated either 5 or 10 amperes, and the potential circuit either 120 or 240 volts. Current and potential transformers can be used to extend this range if necessary.



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# Effect of Salts on the Melamine Resin Wet Strength Paper Process*

By C. S. Maxwell[1] and W. F. Reynolds[1]

## Abstract

*It has been established that the presence of anions, particularly multivalent, in paper stock, has a direct bearing on the effectiveness of the melamine resin colloid as a wet strength agent. Small amounts are necessary for optimum results while larger amounts may have adverse effects. Cations have no significant effects.*

*Ideal conditions for mill application of the resin have been formulated with several compromises suggested for mills not able to fully meet these conditions.*

During the first year or two that the melamine resin colloid was used to produce wet strength paper, results at most mills were satisfactory but at a few mills results were either uniformly poor or were inconsistent. For example, two mills using the same pulp and chemical furnish, operating at the same freeness, and making the same grade of paper, reported entirely different results as far as wet strength was concerned. Even more striking were differences noted on a single machine. In this instance, simply changing the point of addition of the resin from the fan pump inlet to the headbox, increased the wet strength 50%, with no change in resin retention.

TABLE I.—EFFECT OF ALUM ON WET STRENGTH AND RESIN RETENTION

| Alum Added Before Resin, % based on fiber | 0 | 3 | 15 |
|---|---|---|---|
| % Resin in sheet (from 3% added) | 2.3 | 2.2 | 1.9 |
| Basis weight, lb. (25×40—500) | 49.5 | 50.7 | 49.8 |
| Dry tensile, lb./in. | 26.5 | 27.7 | 24.6 |
| Wet tensile, lb./in. | 8.0 | 8.3 | 7.0 |

Note: pH of stock (0.6%) and white water adjusted to 4.5 in all cases. Sheets cured 1 minute on drum at 110° C.

First attempts to duplicate these mill variations under laboratory conditions were not very successful. Refining or violent agitation of the resin treated stock tended to lessen the efficiency of the resin treatment, but not to the extent noted under mill conditions *(1)*. Raw process waters from mills reporting poor results (usually in a hard water area) gave excellent results when used in the laboratory. Alum, under these early laboratory conditions, had only minor effects on the effectiveness of the resin. Small amounts of alum had a slight beneficial effect and higher amounts (up to 13% on fiber) had, if anything, only a very slight adverse effect. As pointed out later by Landes and Maxwell *(2)* still higher amounts of alum were thought to have an adverse effect on the wet strength, presumably because resin precipitation took place.

Even though none of these preliminary laboratory or mill experiments completely solved the problem, the sum total of the findings offered leads that were eventually to clear up much of the the seemingly conflicting data. One such lead was obtained by observing the comparatively small but definite effects of alum (aluminum sulphate) on the wet strength process as are illustrated by Table I.

These figures are typical of a large number of similar tests. It is significant that the resin retentions show a drop with increasing amounts of alum, while the actual wet strength is slightly improved by the addition of 3% alum although somewhat reduced by the addition of 15% alum. This apparent peak in wet strength at 3% alum can be explained by assuming that although the resin retention tends to be reduced by the alum, the buffering action of the alum at a fairly low pH tends to give the resin a better cure.

## Effect of Various Salts

Even though these differences due to alum were real, they were not of sufficient magnitude to explain differences in effectiveness noted in several mill trials. It was reasoned that, if alum had some effect on the

TABLE II.—EFFECT OF VARIOUS SALTS ON MF TREATED PAPER

| Salts in Water at 1600 p.p.m. (on total volume) | Alum Added, % on fiber | % Resin in Sheet, by analysis | Basis Weight, lb. 25×40—500 | Tensile Strength, lb./in. Dry | Wet |
|---|---|---|---|---|---|
| A—(No alum added, pH adjusted to 4.5 with HCl or NaOH) | | | | | |
| Demineralized water | 0 | 1.5 | 52.4 | 26.0 | .. |
| Tap water | 0 | 2.3 | 50.1 | 24.8 | 7.0 |
| $CaCl_2$ | 0 | 2.3 | 49.9 | 23.4 | 7.0 |
| $MgSO_4$ | 0 | 1.4* | 50.8 | 23.4 | 4.4 |
| $Na_2SO_4$ | 0 | 1.5 | 50.9 | 23.6 | 4.4 |
| $MgCO_3$ ** | 0 | 2.2 | 48.2 | 23.8 | 6.0 |
| $NaH_2PO_4$ * | 0 | 2.0 | 50.3 | 25.4 | 7.2 |
| B—(3% alum added before resin, pH adjusted to 4.5 with HCl or NaOH) | | | | | |
| Demineralized water | 3 | 2.1 | 50.8 | 25.4 | 7.2 |
| Tap water | 3 | 2.1 | 51.1 | 25.8 | 7.0 |
| $CaCl_2$ | 3 | 2.2 | 52.4 | 25.4 | 8.4 |
| $MgSO_4$ | 3 | 1.1* | 51.9 | 23.0 | 4.2 |
| $Na_2SO_4$ | 3 | 1.2* | 51.1 | 23.8 | 4.4 |
| $MgCO_3$ ** | 3 | 2.2 | 52.2 | 26.2 | 7.2 |
| C—(Alum added before resin to obtain final pH of 4.5) | | | | | |
| Demineralized water | 0.9 | 2.2 | 52.4 | 25.4 | 7.8 |
| Tap water | 1.7 | 2.3 | 51.2 | 24.8 | 7.2 |
| $CaCl_2$ | 2.5 | 2.2 | 49.3 | 25.2 | 7.8 |
| $MgSO_4$ | 1.8 | 1.3* | 50.9 | 25.2 | 5.2 |
| $Na_2SO_4$ | 1.8 | 1.2* | 49.1 | 21.2 | 4.2 |
| $MgCO_3$ ** | 50.0 | 1.2 | 54.2 | 12.4 | 3.0 |

* 1600 p.p.m. at $PO_4$.
** $MgCO_3$ was dissolved in water saturated with $CO_2$, to form soluble bicarbonates.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Commodore, New York, N. Y., February 23-26, 1948.

[1] Member TAPPI; American Cyanamid Co., Stamford Research Laboratories, Stamford, Conn.

process, other salts might have similar or even more drastic effects. To check this point, a number of salts covering a range of anions and cations were selected, and dissolved in water to form solutions containing 1600 p.p.m. of the salt. Handsheets were prepared using these waters throughout the process, adding 3% melamine resin* in each case and varying the alum as shown in Table II.

After examining this set of data, it was clear that, under the conditions of the experiment, the sulphate ion was the only one seriously interfering with the functioning of the resin. The low resin retention obtained using demineralized** water with no alum present was at first regarded as an anomalous result, but later developments were to prove that resin retentions tend to be low in the almost complete absence of salts. This phase will be discussed more fully a little later.

### Sulphates in Paper Stock

Now consider more closely what happens when alum is added to paper stock.

A major portion of ordinary papermakers' alum is sulphate, and while there is some argument as to the exact chemical reaction between alum and rosin size, there is no doubt that the Al ion is preferentially picked up by the fiber or size, leaving the major part of the sulphates in the stock or white water system. A rough calculation as to the theoretical amounts of sulphates that would be present in an open stock system (assuming no recirculation of white water), where the stock is treated with 3% alum, is as follows:

Papermakers' alum ($Al_2(SO_4)_3 \cdot 14H_2O$)—485,000 p.p.m. $SO_4$ (48.5% $SO_4$)
Beater stock (assuming 6% consistency)—875 p.p.m. $SO_4$
Jordaned stock (assuming 3% consistency) —438 p.p.m. $SO_4$
Headbox stock (assuming 0.6% consistency) —87.5 p.p.m. $SO_4$

If the effect of recirculated white water is considered the picture becomes more complicated. The concentration of sulphates in the headbox will increase to a point of equilibrium that will be determined by the balance of white water and fresh water used, while the sulphates in the beater and jordan stocks will remain unchanged unless white water is used to charge the beater or for subsequent dilution.

In actual determination of sulphate concentrations at a number of mills making sized grades, it was found that the headbox stock or tray water contained from a minimum of less than 100 to as high as 1600 p.p.m. of sulphates. An average figure would be about 400 p.p.pm.

If sulphates under some conditions were adversely affecting the wet strength results, it was imperative that these conditions be found and, if possible, corrected. Therefore, an intensive laboratory study was undertaken, varying the amount of sulphates and point and order of addition of sulphates and resin.

For the first experiment, a number of sets of handsheets were prepared keeping the fiber, water and amount of melamine resin constant and varying the amount of sulphate added to the stock and white water from 0 to 1600 p.p.m. In half of the sets the melamine resin was added before the sulphate, while in the other half the resin was added after the sulphate. To circumvent the high acidity caused by alum, the sulphates were added in the form of sodium sulphate, and the stock and white water was maintained at pH 4.5 with HCl or NaOH. The handsheets were made in a British mold using tap water (containing about 15 p.p.m. sulphates), and were dried for 1 minute on a drum drier at 240°F. Test data on these sheets are shown graphically in Fig. 1.

To determine the possible effects of the process water used, the previous experiment was repeated and expanded, but demineralized water was used throughout the experiment. In this case, a series of handsheets was prepared from bleached kraft pulp that had been carefully washed in demineralized water. Demineralized water was also used to slush the stock and prepare the handsheets. Portions of this stock were treated variously with sodium sulphate and with a constant amount (3% on dry fiber basis) of melamine resin colloid. The effects of adding the resin before and after the sulphate are shown in Fig. 2. It will be noted that the wet strength curves from Figs. 1 and 2 check each other very well from about a point representing 75 p.p.m. and upward of sulphates, but a striking difference exists in the range of 0 to 75 p.p.m. sulphates. The poor results obtained in the almost complete absence of salts are in agreement with the value reported in Table II, which was obtained under similar conditions. Apparently there were enough sulphates (and/or other ions) in the ordinary tap water (Fig. 1) to completely mask this portion of the curve.

* The melamine resin used for all experimental work reported herein was a trimethylol melamine resin known commercially as Parez Resin 607.

** The demineralized water was obtained by passing water from the city supply line through ion exchange resin beds. It is equivalent to distilled water in ionizable salt content.

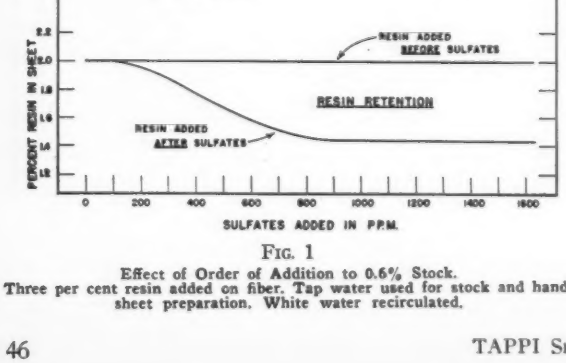


FIG. 1

Effect of Order of Addition to 0.6% Stock.
Three per cent resin added on fiber. Tap water used for stock and handsheet preparation. White water recirculated.

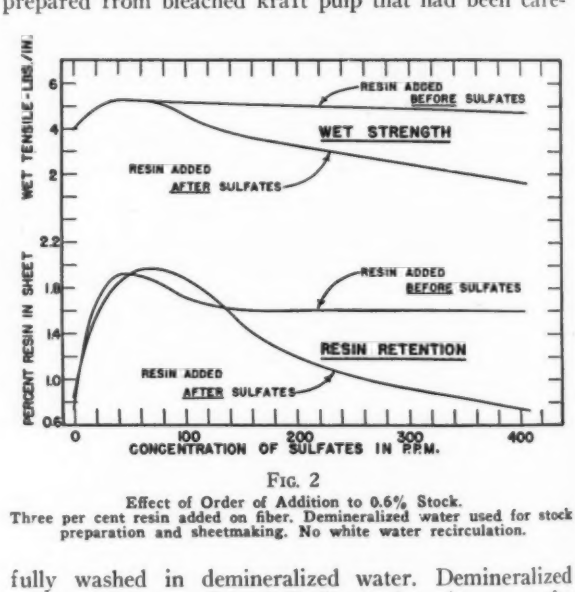


FIG. 2

Effect of Order of Addition to 0.6% Stock.
Three per cent resin added on fiber. Demineralized water used for stock preparation and sheetmaking. No white water recirculation.

## Effect of Other Anions

Here was evidence that the sulphates were playing an important part (sometimes beneficial, sometimes adverse) in the wet strength treatment of paper with melamine resin colloid. In considering the possible mechanism of this process it was considered probable that the anionic sulphates had a precipitating action on the colloid; small amounts tending to decrease the stability of the colloid to a point where it could be readily picked up by the fiber, and larger amounts tending to actually precipitate the cationic resin and prevent it from being picked up by the fiber. If this general picture were true, other anions should have a similar effect but the actual concentration required for a given effect would be expected to vary with the valency of the anion (Schulze-Hardy rule) and to a lesser extent be affected by the specific anion present.

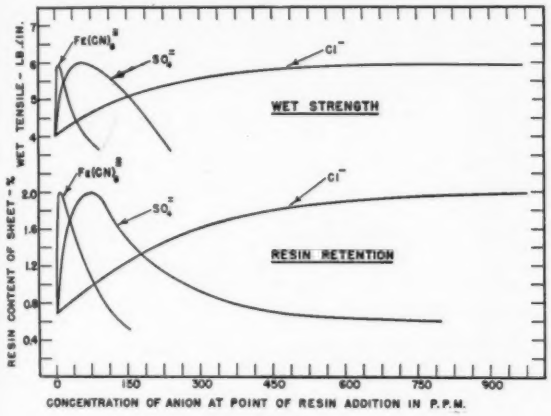


FIG. 3

**Effect of Mono-, Di- and Trivalent Anions on Wet Strength and Resin Retention.**

At first glance, this hypothesis has already been disproved in our first work on the effect of salts on the wet strength process (Table II), for here the carbonate and phosphate radicals which are usually considered di and tri valent respectively, behave more like monovalent ions. Of course, the answer to this is, that under papermaking conditions, carbonate and phosphate ions do not exist as such, but rather as the monovalent ions $HCO_3$ and $H_2PO_4$.

In seeking a direct comparision among several anions differing in valency, beaten bleached kraft pulp was washed and suspended in demineralized water and treated with various amounts of monovalent chloride, divalent sulphate and trivalent ferricyanide ions, before being treated with 3% melamine resin. The following set of curves (Fig. 3) graphically illustrates the effect of these ions on the resulting wet tensile strength and resin retention.

From this group of curves, there is strong evidence that the valency of an anion is the major factor in determining its effect on the wet strength process. As a practical measure any further consideration of ferricyanide and other trivalent ions can probably be neglected as they are usually not found in the normal papermaking procedures, although an obvious exception would be the case of a mill reusing sensitized blueprint broke that might contain appreciable quantities of ferricyanide. Because the monovalent ions require such high concentrations before they become objectionable, it is doubtful whether these ions would ever be troublesome under mill conditions. Thus it was clear that our efforts should be directed toward modifying the melamine resin process so as to eliminate, or at least reduce, the adverse effects of the sulphate ion specifically, as this anion is by far the most prevalent in usual papermaking practice.

## Precipitation of Resin by Anions

As anions were definitely affecting our results, it seemed reasonable to believe that they either destroyed the colloidal properties of the resin or in some manner reduced the surface activity of the pulp fibers. As it was more difficult to cope with the latter possibility, attention was turned to the action of anions, and more specifically sulphates, on the resin colloid itself, in the absence of fiber.

To study this point, melamine formaldehyde-hydrochloric acid solutions were treated with sulphate under a wide variety of conditions including variation in age and concentration of the resin solution, and in amount of sulphates added. It soon was evident that sulphates decreased the stability of the resin solution and caused precipitation.

In this work the degree of precipitation caused by the addition of sulphates was measured by an integrating sphere turbidimeter in which the light was passed through a definite thickness of the sample in a glass cell. No attempt was made to place the galvanometer readings on an absolute basis, but the relative turbidities of the resin solutions are sufficient to give some very interesting information.

Figure 4 shows the effect of sulphates on a MF-HCl solution that has been allowed to age at 12% solids, but was diluted to 1% solids before treatment with sulphates. For most of this work, a stock solution of sodium sulphate containing 50,000 p.p.m. of sulphate ion was used, as this caused a minimum pH disturbance and little dilution effect, yet could be accurately measured in a microburet.

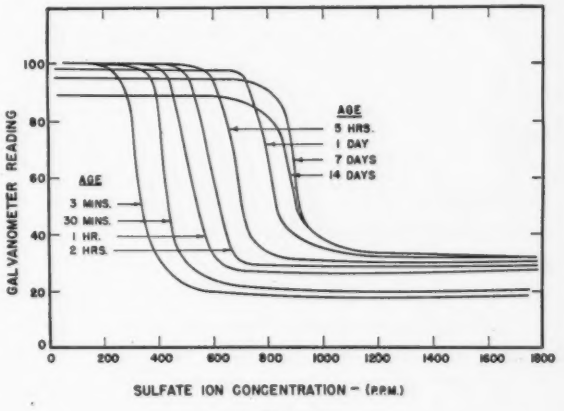


FIG. 4

**Precipitation of Melamine Resin Colloid by Sulphates.**

Interpreting this family of curves, it is clear that the resin becomes more resistant to the precipitating action of sulphates as it ages. Moreover, most of this change takes place in the first few hours during which the resin solution is also building up its characteristic colloidal properties that are so important in the wet strength process.

It is interesting to note the similarity, yet the difference, between the above curves and the next, which shows the precipitating effect of sodium chloride on similar resin solutions. The shape of this curve is the same as the sodium sulphate curves, but much higher

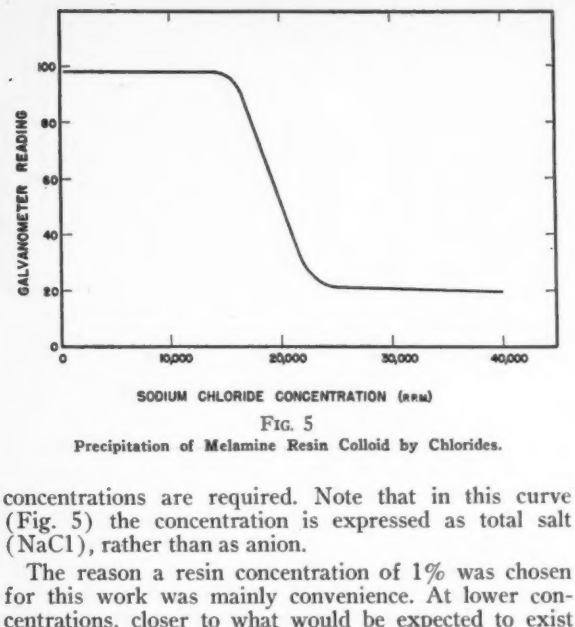


FIG. 5
**Precipitation of Melamine Resin Colloid by Chlorides.**

concentrations are required. Note that in this curve (Fig. 5) the concentration is expressed as total salt (NaCl), rather than as anion.

The reason a resin concentration of 1% was chosen for this work was mainly convenience. At lower concentrations, closer to what would be expected to exist in a paper machine stock chest or headbox, similar precipitation of resin occurs. However, the turbidimeter becomes progressively less sensitive with dilution and therefore differences become more difficult to detect. A comparison of the effect of sulphates on aged resin solutions at several concentrations is shown in Fig. 6. It is evident from these curves that the lower the resin concentration, the more sensitive is the resin to precipitation by sulphates.

## Effectiveness of Precipitated Resin

It was perhaps reasonable to assume that a resin already precipitated by salts would not be effective as a wet strength agent, but just to make sure, it was tried. Preliminary work gave very conflicting results so a study was made of the effectiveness of a resin immediately after precipitation with sodium sulphate, and again after various time intervals.

In keeping with the usual experimental conditions, materials were added so that the final pulp slurry would (1) be at 0.6% consistency, (2) be treated with 3% resin and (3) have a definite sulphate concentration—in this case, 400 p.p.m. To obtain this objective, the measured amounts of resin colloid and sodium sulphate were mixed together with most of the water (demineralized) required for the system and fiber added to identical portions of these mixtures after various time intervals. This kraft fiber had been beaten to a Green freeness of 500 ml. in demineralized water and dewatered by filtering and pressing. These batches of stock were made into handsheets in the British sheet machine and tested for wet strength. The results of this work are shown in Fig. 7.

It is apparent that the effectiveness of the precipitated resin is impaired only after the precipitate has aged about 5 minutes, after which time it deteriorates fairly rapidly. No attempt has been made to determine what actually happens here, but it is presumed that the freshly precipitated resin redissolves before being absorbed by the cellulose fibers.

Of course there is no situation in a paper mill where the resin would be actually mixed with sulphates (alum) before being added to the stock but there are certain mill conditions that might give this same effect. For example, in a case where the resin is added to the dilute stock at the headbox, there are only a few seconds for the resin to be adsorbed by the fiber before the sheet is formed. Presumably, under these conditions, a certain amount of the resin has not had time to be adsorbed, so it passes through the wire and is present in the white water. On recirculation of this white water a few seconds later the resin present would have another chance to be picked up by the fibers, that is, if it is still capable of being adsorbed. If sulphates from the alum in the system are also present in the white water, there is essentially a case where the resin and sulphates are mixed before being added to the fibers. Depending on the concentration of resin and sulphates, and the time necessary to recirculate the white water, varying degrees of efficiency of the overall resin treatment would be expected. The authors are not prepared to say just

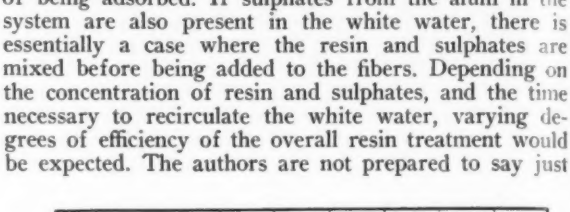


FIG. 6
**Effect of Resin Concentration on Precipitation of Melamine Resin Colloid by Sulphates.**

what the optimum sulphate concentrations under these conditions would be. However, based on recent laboratory work, the present tendency is to add the resin farther back in the system, allowing more time for complete adsorption. Under such conditions the effect of recirculation should be negligible and the question of the effectiveness of precipitated resin becomes mainly of academic interest.

Some effects of sulphates and other ions on the melamine resin colloid have been reported by Borje Steenberg (3). It is interesting to note that, although the two studies were made entirely independently of each other, the data agree remarkably well.

The basic principles underlying the melamine resin wet strength process are constantly being studied with a view to obtaining increased efficiency. In this connection it should be noted that a report on some of the fundamental work carried out in our laboratories has been published *(4)* with more to follow soon *(5)*.

## Mill Application

In the previous portions of this article, a cross section of laboratory data that describes the action of sulphates—and to lesser extent other anions—on the melamine resin wet strength process has been presented. Now these laboratory findings must be applied to conditions as they actually exist in paper mills. As a complicating factor, the fact that no two mills are identical, and that each application requires separate study must be accepted.

Here are the conditions that the laboratory work has

indicated will give best results in an "ideal" mill.

1. Refine the stock fully in the beaters before addition of resin to the thick stock.

2. Add the resin to the stock which has a sulphate concentration of about 75 p.p.m. This means, in effect, before the addition of any major quantity of alum.

3. Allow the resin treated stock to stand at least 15 minutes before addition of alum (sulphates) or dilution with fresh or white water.

4. Do not jordan or otherwise refine the resin treated stock.

At first glance these above conditions are almost at direct variance with past mill experiences. Time and time again reports have been received from mills to the effect that the resin was much more effective when added to dilute stock at the headbox, than at other points in the system. A specific example of such a mill experience has been pointed out previously by Landes and Maxwell *(2)*. However, there were exceptions to this general conclusion. Sometimes no difference in efficiency was obtained by varying the point of resin addition and in some cases the headbox addition actually gave poorer results. Of course, the effect of sulphates was not recognized during these earlier trials but it is now realized that this factor could have been responsible for most of the apparent discrepancies.

Many mills are going to find it impossible to follow the above outline completely because of equipment limitations, so comprimises must necessarily be made. Let us now consider conditions at several hypothetical paper mills where it is desired to make wet strength grades.

CASE I

Perhaps the simplest system to consider is one used in making toweling or other absorbent grades. The stock is given very little beating or other refining, and no size or alum is used.

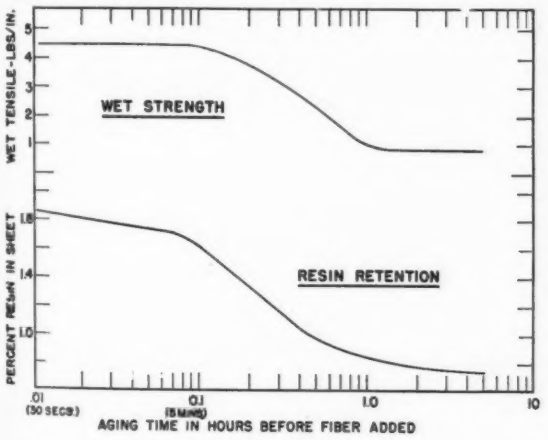


FIG. 7
Effectiveness of Precipitated Resin.

*Suggested Procedure.* The stock should be broken up or beaten in the usual manner. If the water used is very low in dissolved salts, sulphates (i.e. $H_2SO_4$ or $Na_2SO_4$) should be added to obtain a concentration of 75 p.p.m. Because of its sizing action, alum should not be used. The resin should be added to the thick beater stock and allowed to mix thoroughly before dropping to the chest. Acids to control machine pH for satisfactory resin cure (pH 4.5 to 5.0), may be added at any convenient point.

Mills making sized papers have more complicated and more varied methods of stock preparation and treatment, and therefore will require more individual attention. In this article it would be impossible to prescribe specific methods of applying the resin for each separate case but a few typical ones will be considered.

CASE II

Mills making paper from beater refined stock, that is dropped to the beater chest, pumped to the machine chest and jordaned lightly before dilution at the fan pump.

*Suggested Procedure.* Beat the stock to desired freeness, adding rosin size at any desired time during the beating cycle, or even after the resin. Add the melamine resin colloid to the beaten stock in the beater and allow to circulate for at least 15 minutes before adding the required alum. From this point on the stock may be handled in the usual manner.

CASE III

Mills making paper from stock that is broken up in a beater but which depend largely on subsequent jordans or other refiners to prepare the stock to the desired freeness before storage in the machine chest.

*Suggested Procedure.*—Add rosin size where convenient. Add the melamine resin colloid to the jordaned stock in the machine chest which usually will have sufficient capacity to permit 15 minutes or more contact between resin and fiber. Add the alum required for sizing and pH control at the fan pump or headbox.

CASE IV

Mills preparing stock partially in beaters, storing in beater and machine chests but jordaning the stock heavily going to the machine.

*Suggested Procedure.*—Add rosin size and alum to beaten stock in beaters, but keep quantity of alum to the minimum required for satisfactory sizing, using hydrochloric acid if necessary, to obtain desired pH. Add melamine resin at or just previous to the headbox, or otherwise to the stock at its minimum consistency which also should be its point of minimum sulphates.

The above examples by no means exhaust the combinations of conditions that can exist in paper mills, nor are they offered as rigid rules to follow. Rather, they should serve as starting points in a drive to obtain maximum efficiency from the melamine resin treatment.

As a basic step in this direction the technical director of a paper mill should determine the type of system he has—how much and where is most of the refining done—what is the sulphate concentration at various points in the system and in the raw water. Knowing these factors, the problem can be scientifically attacked in the light of the data now available, rather than in the hit-or-miss manner that has had to suffice in the past.

## Acknowledgment

The authors wish to acknowledge the contributions and assistance of Dr. F. G. Sawyer and Messrs. A. F. Blockman and C. A. Davis. Permission of the American Cyanamid Company to publish this material is greatly appreciated.

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# Causes of Dimensional Instability of Paper Base Phenolic Resin Laminates on Total Immersion in Water*

By C. J. Straka[1]

**Abstract**

*This paper discusses the influence of various factors on the dimensional stability of phenolic resin, paper base, high pressure laminates on total immersion in water. Most of the data presented here deal with laminates made from absorbent kraft paper.*

In determining dimensional stability of laminates, some care must be taken in the selection of specimen

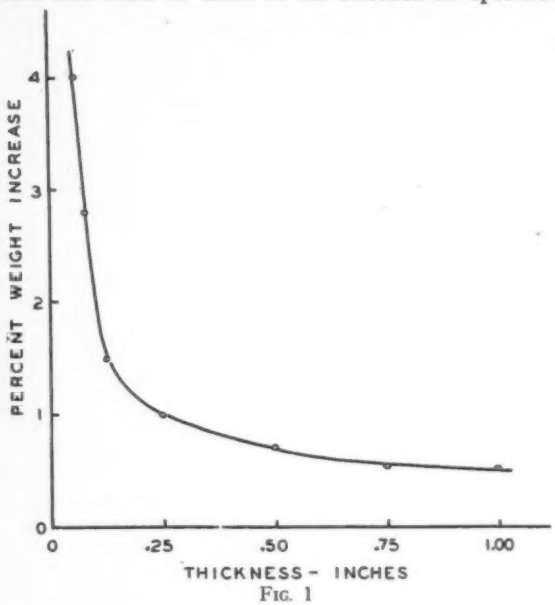


FIG. 1

size, method of conditioning, and choice of measuring instruments. For example, it is necessary to select some particular laminate thickness as the standard for comparison, since there is quite a difference in the dimensional stability of laminates of various thicknesses. The amount of difference is shown in Figs. 1 and 2.

It has been convenientt to use a specimen size 3 inch × 1 inch × 1/16 inch for measurements of weight increase and thickness increase. This particular size was selected chiefly because this type of specimen has been in use in other test methods such as specified by ASTM and the Navy Department. For length measurements we have, however, deviated somewhat from the usual and selected a length of 5½ inches with a ½ inch width. This was a choice of convenience, but the chief aim was to achieve greater accuracy by use of a long specimen.

Before measurements are made, both types of specimens are conditioned in an oven at 105°C. for 1 hour and then cooled to room temperature in a desiccator in the usual fashion.

In determining thickness by means of a Sheffield Visual Gage it was first necessary to standardize by means of precision gage blocks. Blocks of the following sizes are used: 0.0550, 0.0625, 0.0700, 0.0782, which gives an overall range of 0.0546 to 0.0822. The specimen to be measured is placed in the measuring position up against a back stop. This gives the value, which is read on the illuminated scale, for center thickness. The specimen is then slid forward up to the front stop, and the edge thickness is then read in the same manner. To eliminate the effect of warpage on the measurement, the base of the testing area is fitted with a raised inserted section ¼ inch in diameter, directly underneath the measuring pin.

The instrument used for length measurements consists of a dial gage graduated in 0.0001 inch and having a total travel of 0.200 inch. The gage is mounted upon a 1-¼ inch diameter metal rod, which is exactly perpendicular to a polished flat metal base. The gage mounting is arranged so that it can be raised or lowered and can be locked in place. Here again the instrument is standardized by means of three precision gage blocks which are 5.4600, 5.5000, and 5.5250 in length. A metal vise is used to keep the specimens flat and perpendicular and thus eliminate the effect of warpage. The specimens after measurement are immersed in distilled water at 25°C. and can be removed for measurement at any convenient time.

## Resin

Phenol-formaldehyde resin may be prepared simply by

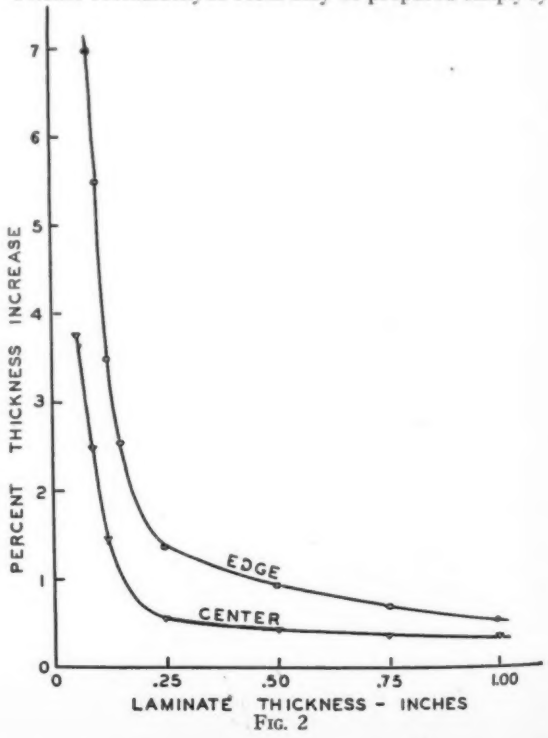


FIG. 2

* Presented at the meeting of the Plastics Committee of the Technical Association of the Pulp and Paper Industry held in Syracuse, N. Y., September 25-26, 1947.

[1] Westinghouse Electric Corp., Micarta Division, Trafford, Pa.

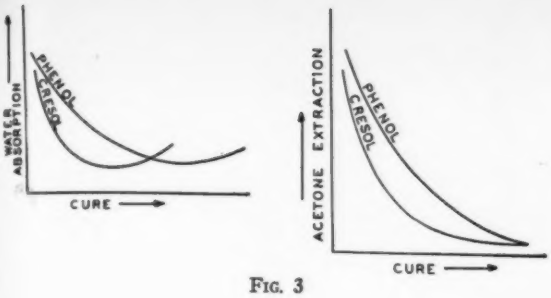


FIG. 3

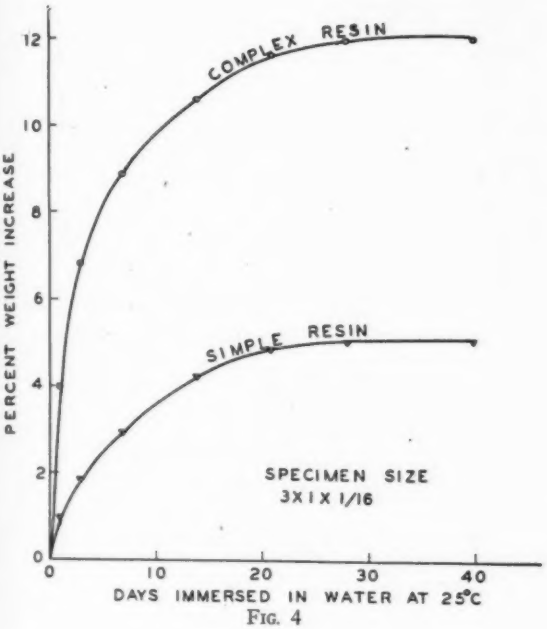


FIG. 4

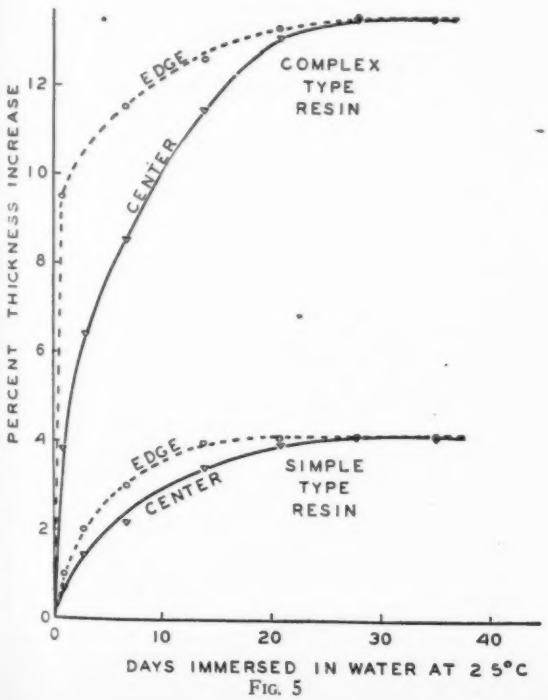


FIG. 5

heating phenol and formaldehyde together in the presence of catalyst. The preparation is capable, however, of considerable variation, and the product varies in properties according to the type and proportions of the reactants and the time and temperature of condensation.

Cresol-formaldehyde resin, for example, polymerizes faster than phenol-formaldehyde resin under similar conditions. The polymerization of both resins consists of, first, the formation of chainlike molecules and, later, the cross linking of these chains. The first step and the earlier stages of the second step take place in the resin kettle and to a slight amount in the treating tower. The latter stages of the second step take place during the molding operation. It is this latter step that produces a hard, infusible resin, practically unaffected by solvents. As the heating of the resin continues, the larger polymeric units vie for the smaller molecules, so that after prolonged polymerization the resin begins to be porous as the central molecules annex the smaller units to their own mass.

Experimental proof of this phenomena is shown in Fig. 3, which presents the relationship between moisture absorption and cure time of a pure phenol-formaldehyde resin containing no filler and a similar cresol-formaldehyde resin. In both cases the increase in moisture absorption is caused by porosity occurring in the resin structure.

The increased cross linkage of a resin with advancing cure renders it less susceptible to the action of solvents by the gradual elimination of soluble phenols, cresols, and resin intermediates. This relation of solvent resistance and cure is also shown in Fig. 3.

The degree of impregnation obtainable with a given paper varies with the molecular complexity of the resin used. Good impregnation results from the use of resin of small molecular size. In addition, with this type of resin it is possible to use solvents, such as water, which tend to have a swelling action on the cellulosic fiber and thus aid the impregnation. There is quite a difference, therefore, between a simple resin dissolved in water and a more complex resin dissolved in alcohol. The extent of this difference is shown in Figs. 4 and 5.

There are, however, disadvantages to the use of resins of low molecular weight—they require a longer drying time and result in more brittle laminates.

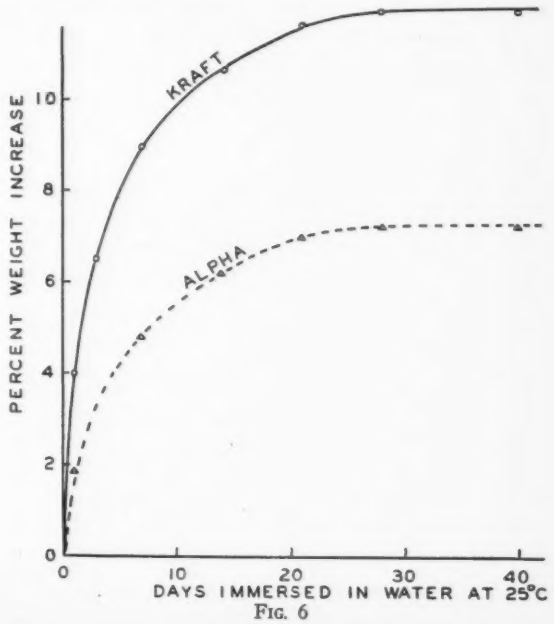


FIG. 6

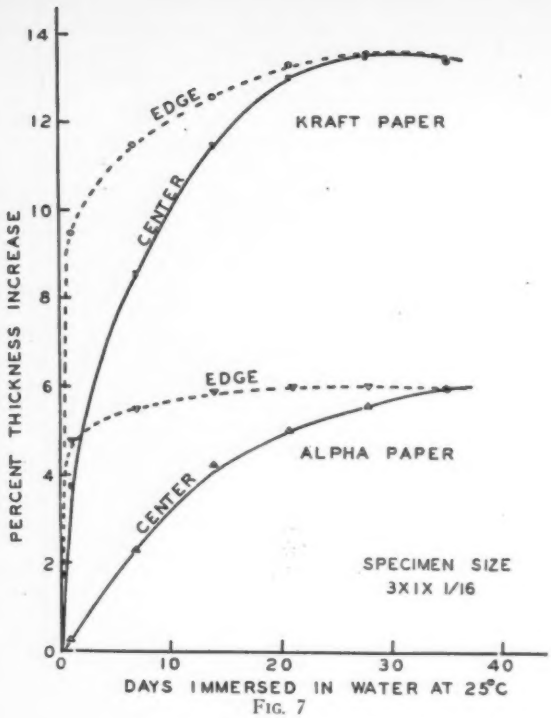

FIG. 7

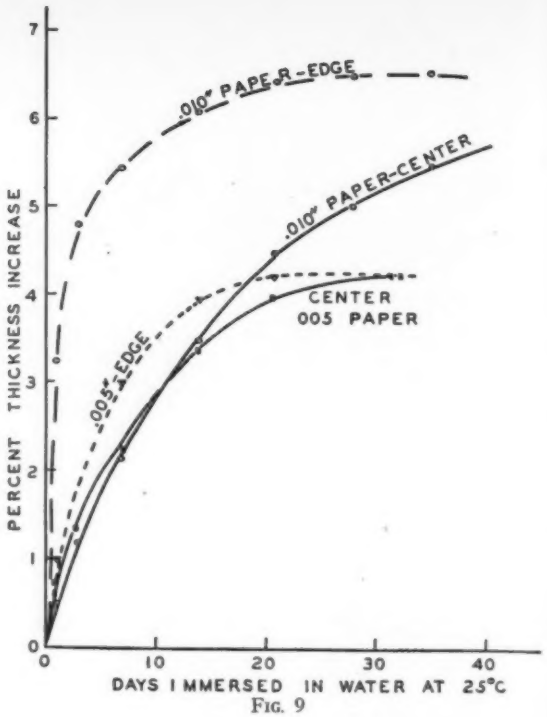

FIG. 9

## Paper

Most of the paper used in commercial laminates is made from wood. The type of paper obtained and its influence on dimensional stability depends on the locality from which the original wood is obtained, as well as on the nature of its processing. As is well known, the type and the degree of digestion has a great influence on the strength and absorbency obtained in the final paper sheet. An alkaline treatment, for example, helps to retain absorbency with a minimum loss of fiber length, while sulphite pulps are somewhat harder and tend to be less absorbent. "Alpha"type pulps, which are prepared by further treatment of the normal pulps, have a high degree of absorbency and fiber length and are very suitable for conversion to laminates. However, the extra processing and lower yield make alpha papers relatively expensive. Figures 6, 7, and 8 show the difference in the dimensional stability of laminates made from papers of different absorbencies.

The nature of the impurities left in a sheet of paper also have an influence on the properties of the finished laminate. Acidic or alkali impurities will have an effect on the cure of the resin. This effect may result in poor dimensional stability as we will see later in the discussion.

The strength of the laminate made from paper containing impurities may also be inferior, since the im-

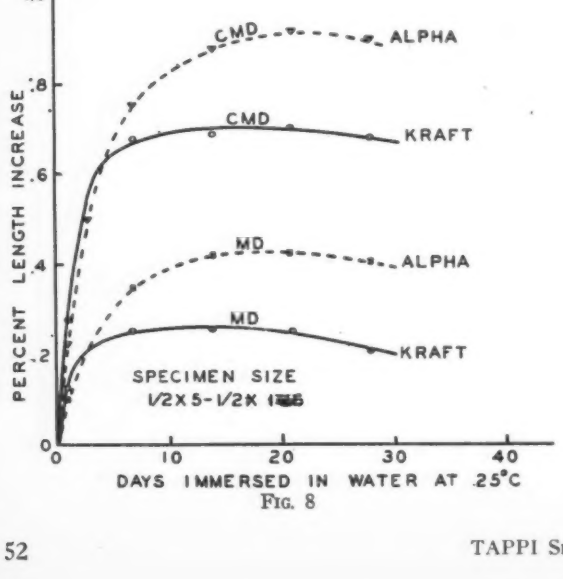

FIG. 8

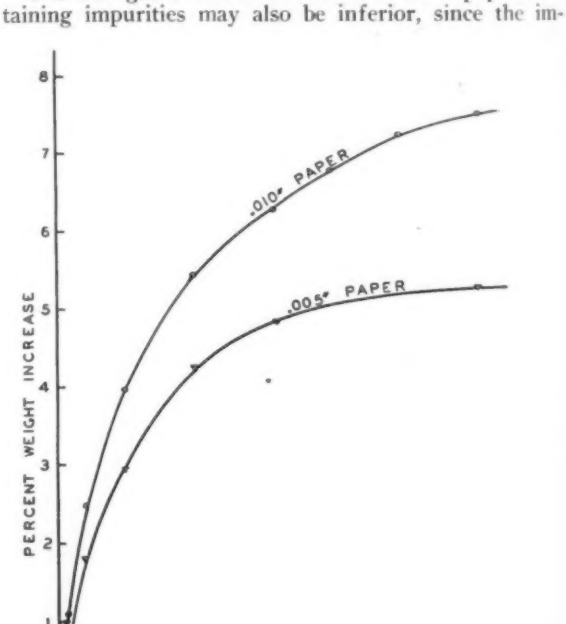

FIG. 10

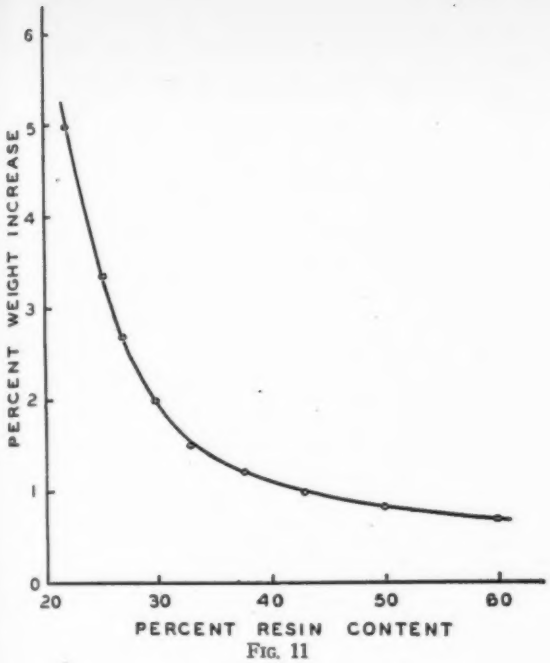

FIG. 11

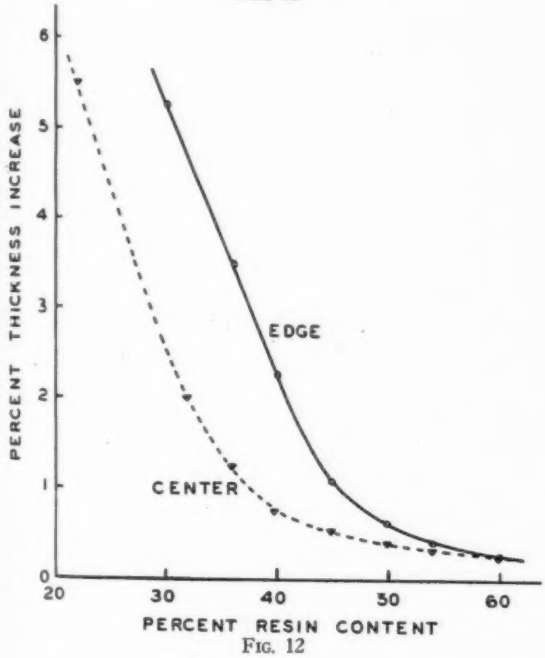

FIG. 12

purities may accellerate thermal degradation during the molding process. It is desirable in all cases to eliminate these impurities.

The mechanical treatment of the fibers has a great influence, on the properties of the paper. For instance, with a close adjustment and good cutting action, absorbency is retained; with a wide or open adjustment, scraping of the fiber is obtained; with a conversion of the fibers into smaller fibers or fibrillae and if a blunt close adjustment is maintained, the result is an impact beating of the fibers giving gelatinous and slimy fibers which dry to a hard compact, nonabsorbent sheet. It is desirable in making paper for laminates to select the type of mechanical treatment which will result in the maximum amount of absorbency and maximum strength.

The way the pulp flows on the wire and the degree of vibration maintained regulates the alignment of the fibers. Most commercial papers are made with higher strength in the machine direction of the sheet. It would be desirable, from the converter's point of view, to have a balanced strength construction. The nature of the fiber distribution also influences the longitudinal swelling of laminates exposed to water immersion.

Further operations on the paper machine, such as the degree of compression of the wet sheet and the nature of the drying, must be carefully done since they also influence the properties. A high degree of compression will make the sheet dense and nonabsorbent, and the drying should be done gradually if best results are to be obtained.

Besides possessing a high degree of absorbency, the paper used for making laminates should be uniform in caliper and basis weight. The thickness of the paper used influences the dimensional stability of the laminate. This is shown in Fig. 9 and 10.

It would be desirable if a good method for measuring absorbency of a paper sheet could be found. It is believed that the method should be based on a system which evaluates penetration through the sheet, rather than longitudinal absorbency.

## Conversion

TREATING:

The properties required in a laminate determine the manufacturing conditions. If strength properties are of paramount importance, the optimum resin content is that which just fills the air voids in the paper at any given pressure. On the other hand, if dimensional stability is more important, it is desirable to have high resin content. This latter condition, however, results in a sacrifice in strength. In most cases it is usually found that a compromise is necessary. The relationship be-

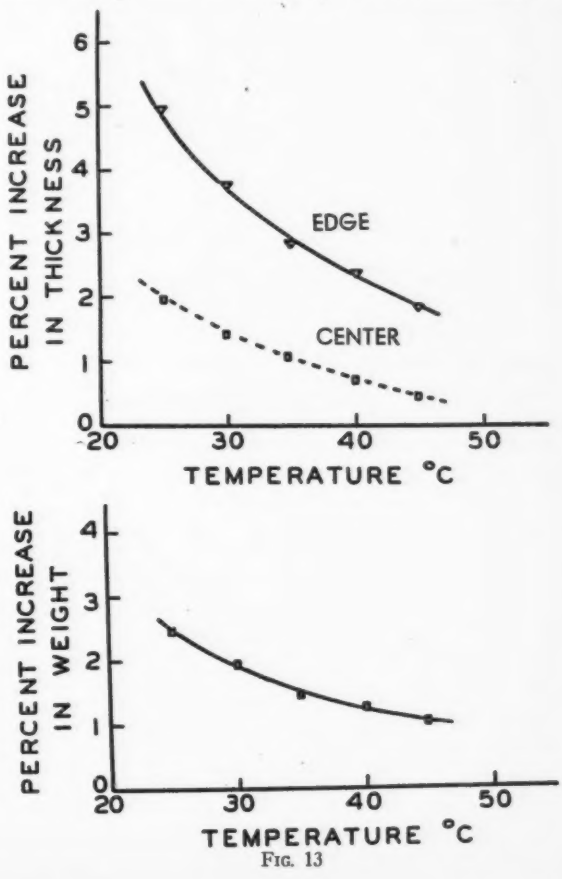

FIG. 13

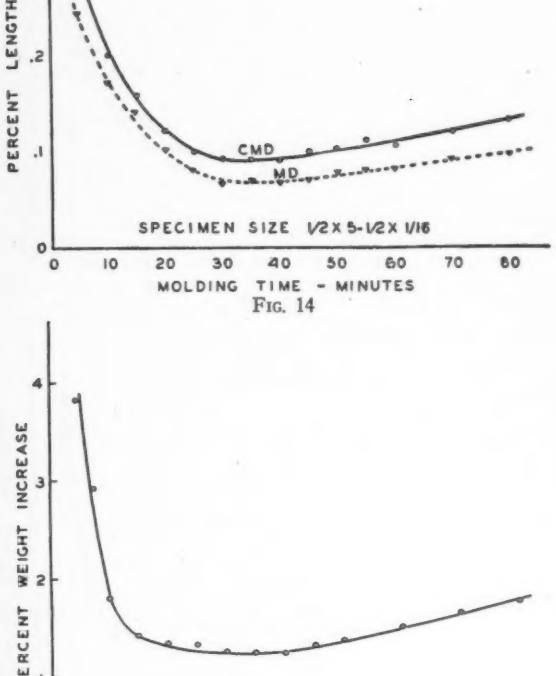

FIG. 14

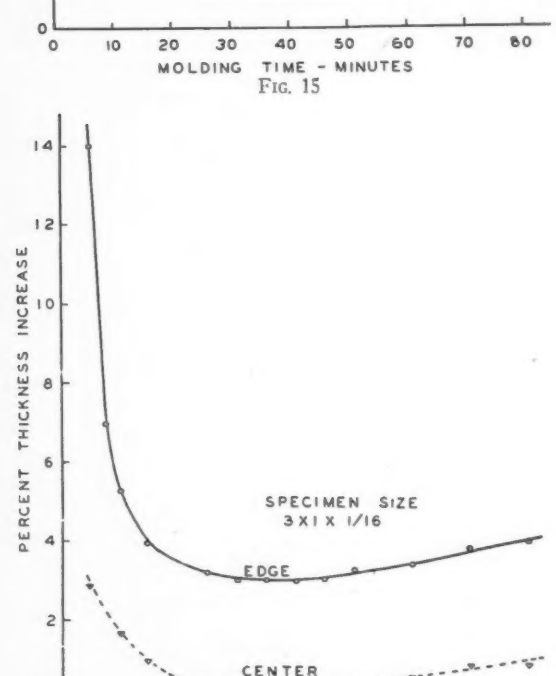

FIG. 15

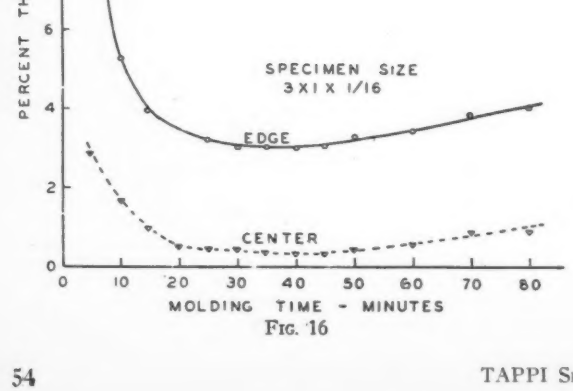

FIG. 16

tween resin content and dimensional stability is shown in Figures 11 and 12.

In any case it is necessary to insure that the resin is evenly distributed through the paper during the impregnating process. It is desirable also to have the paper with a uniform caliper and basis weight and with a closely controlled degree of absorbency.

The impregnating operation should be done on a treating machine of the dip and squeeze roll type, which aids to drive the resin into the sheet. The resin pick up is controlled by the adjustment of the squeeze roll clearance.

It has also been found necessary in this operation to control the temperature of the resin solution. The effect of temperature variation on dimensional stability is shown in Fig. 13. While these data indicate that maintaining the resin solution at higher than room temperature would appear to be a means of obtaining better dimensional stability, this method involves certain difficulties. Some of these are premature thickening of the solution, specific gravity increase due to solvent loss, and decrease in resin tank life.

The length of time that the paper is in contact with the resin solution as well as the degree of drying also influence strength and dimensional stability. The soaking time necessary is related to the absorbency characteristics of the paper used and the degree of soaking can be controlled by the running speed.

The drying operation should be of such a nature that during the pressing operation there is obtained the minimum flow necessary to give complete bonding. Drying removes volatile substances which may consist of free water or solvents, and resin intermediates which act as plasticizers. As these are removed, the resin flow decreases. In addition, the resin, due to the heat used for drying, advances in molecular complexity which also decreases resin flow. The extent of drying can, therefore, be controlled by determinations of flow, volatile content or solubility.

Under commercial conditions, due to the pressure of production, there is a tendency to use high temperatures for drying. Under this condition water may be trapped in the body of the paper if the surface resin becomes pre-cured and less permeable to water vapour. It is desirable, therefore, to use low temperature drying to enable the moisture to be removed more uniformly and to eliminate pre-cure of the surface resin.

MOLDING:

In the molding operation the main function of pressure is to reduce the voids in the paper. The water absorbed by a laminate on immersion decreases with increasing laminating pressure in proportion to the decrease in voids. Since most highly absorbent papers contain a high percentage of void, it is usually necessary to resort to the use of high pressures for laminating to achieve good strength and dimensional stability.

In the discussion of resins, we have seen that it is necessry to cure properly in order to get good dimensional stability. Figs. 14, 15, and 16 show the effect of cure on the water absorption and dimensional stability of a kraft paper laminate. Here again, overcuring produces porosity resulting in poor dimensional stability.

While this report has shown the effects of various factors on the dimensional stability of laminates, further experimental work is being carried on to study paper structure and its relation to dimensional stability. Twenty different papers have been prepared on the Forest Products' experimental paper machine from eight varieties of pulp. These papers were made to study the effects of pulp source, fiber orientation, porosity, and density.

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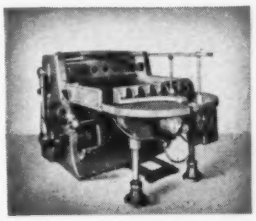

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